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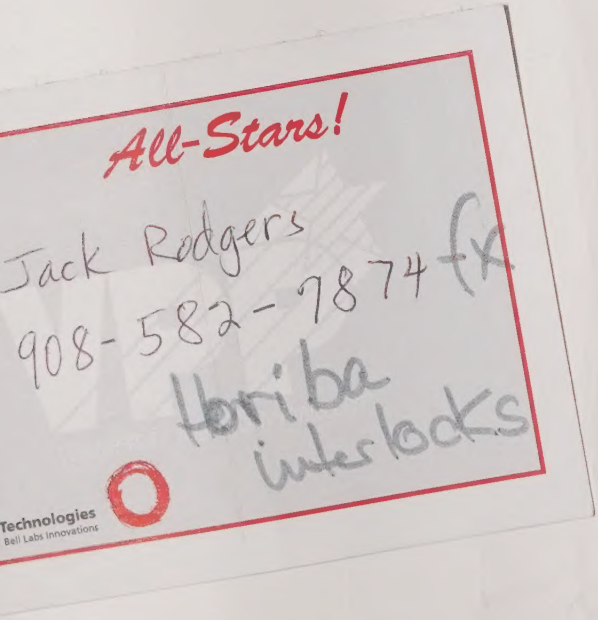
All-Stars!
Jack Rodgers
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Horiba
interlocks
Technologies
Bell Labs Innovations

SLFA-20/20T
Sulfur-in-Oil Analyzer
Service Manual

Version B
June 1997

HORIBA INSTRUMENTS INCORPORATED
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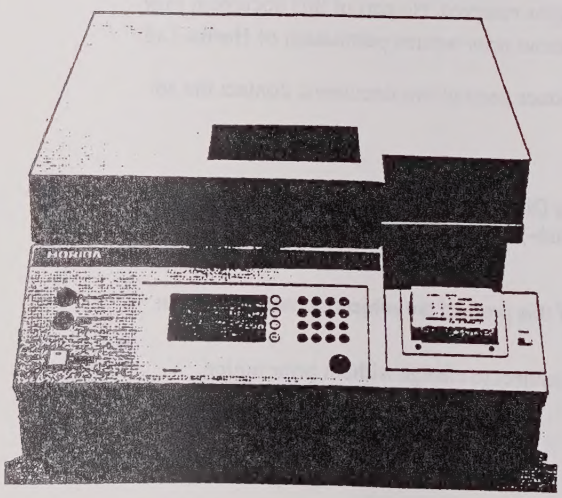
HORIBA

SULFUR–IN–ANALYZER
SLFA–20/20T
SERVICE MANUAL



SAFETY PAGES

HOW TO READ THIS MANUAL

PREFACE

CHAPTER 1
SAFETY FUNCTIONS

CHAPTER 2
ERROR MESSAGES

CHAPTER 3
MAINTENANCE MODE

CHAPTER 4
S. MAINTENANCE MODE

CHAPTER 5
INSPECTION

CHAPTER 6
CHECKING AFTER THE OPERATION

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REPLACING

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WIRING DIAGRMS AND CIRCUIT DIAGRAMS

CHAPTER 11
ASSEMBLY OF THE SLFA–20 AND ST–20

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PARTS LIST

Product History

IMPORTANT : Read and understand all instructions carefully prior to using.
READ AND KEEP THIS MANUAL

CODE : I042634100
Version B June 1997

Limited Warranty

- We have carefully prepared the contents of this document. In spite of this, this manual may contain some errors or inadequate descriptions. We reserve the right to modify the contents of this document to improve accuracy or to accommodate changes made to the product.

- We shall not be responsible for any damages arising from any causes other than stated in this document.
  If a problem other than those described herein should occur during repair work on the product, contact Horiba or its representative.

- This document is intended for service personnel who will be involved in repair work on the product. Therefore, this manual assumes that the reader has a basic technical understanding of the product.
  Customers who return the manual user registration form will be provided with additional information on the product and/or an appendix to this document.

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  Document Center
  Sales Planning Dept., Marketing Division, Horiba Ltd.
  Miyanohigashi, Kisshoin, Minami-ku, Kyoto, Japan 601
  Phone: 075-313-8122

- The specifications and/or appearance of this product are subject to change without prior notice.
  The contents of this document are also subject to change without prior notice.

Safety Pages

Handling Safety Precautions

- SLFA-20 and SLFA-20T are for analyzing sulfur using X-ray (Radiation). In normal condition, the installation has a safety interlock system to avoid X-ray leakage when opening the panel. Therefore, do not unlock the interlock.
- SLFA-20 and SLFA-20T are using High Voltage Power for X-ray and Detector. Normally the installation has a safety power off system as above. When handling internal parts of the installation, be sure to wait for about 1 minutes to dischange high voltage circuit.
- X-ray tube and proportion counter has Be (beryllium) and can not be wasted. Both X-ray and proportion counter should be returned to HORIBA Ltd. through service division after changing. HORIBA Ltd. will survey the cause and waste following to the regulation.
- Nb. film is attached on the surface of the top part of the detector. Do not touch with fingers.

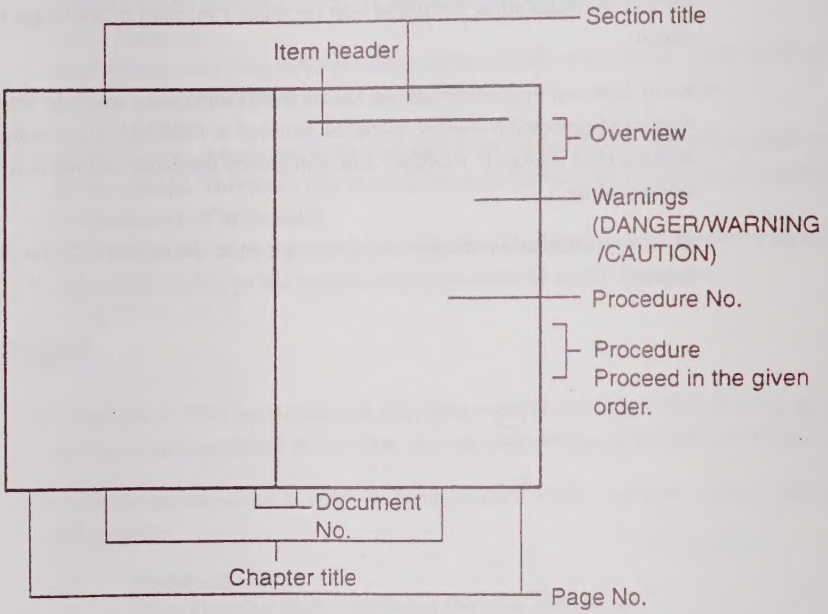
How to Read this Manual

Purpose of this Manual

- This document is intended for service personnel and, therefore focuses on troubleshooting and post-repair checking of the product.

Page Layout

- Pages in this manual are laid out as shown below.



Indicators for Version Specific Information

- When any description in this manual applies to a specific product version, an indication such as (Ver. 2) is provided.

Refer to the Product History at the end of this manual for information on the product versions.

How to Read this Manual (Cont.)

Warning Messages Used in This Manual

- WARNING
  Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
- CAUTION
  Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injuly. It may also be used to alert against unsafe practice.

WARNING	Many samples are inflammable. Keep samples and unit away from flame.
CAUTION	This measurement should be carried out if the Analyzer does not function properly. When it is hard to perform measurements smoothly, contact our service representative.
CAUTION	As soon as the measurement is complete, take out the sample cell from the unit. The analyzer filled with inflammable vapor may catch fire. Specially, be careful about high volatile sample.
CAUTION	This checking should be carried out if the Analyzer does not function properly. When it is hard to perform checking smoothly, contact our service representative.

Abbreviations and Symbols Used in This Manual

- Abbreviations and symbols used in this manual and their meanings are as follows.

Abbreviation/Symbol	Meaning
[XHV-02]	XHV-02 board
Ref.▸▸▸ Instruction Manual	See pertinent page in Instruction Manual.
Note▸▸▸	Information useful to service

How to Read this Manual (Cont.)

Related Documents

- The documents below contain information on the SLFA–20/20T. Refer to them as necessary.

Genre	Language	Availability	Code No. (Catalog Request No.)
Catalog (SLFA–20/20T)	English	○	HRE–3876A
Instruction Manual (SLFA–20)	Japanese	○	I042295000
	English	○	I042296200
Instruction Manual (SLFA–20)	Japanese	○	I042391000
	English	○	I042392100
Service Manual (SLFA–20/20T)	Japanese	○	I042633100

SLFA–20 Series Configurations

The SLFA–20 series consists of three different pieces of equipment.

1 SLFA–20 single sample analyzer
2 SLFA–20T 12–sample analyzer
3 ST–20 auto–sampling unit

The SLFA–20T is the SLFA–20 model with the ST–20 auto–sampling unit installed. Normally the SLFA–20 and SLFA–20T models are shipped from the factory in the above–stated configurations, but marketing agents and users may upgrade their SLFA–20 machines by installing the ST–20 unit themselves. We recommend, however, that you send your SFLA–20 analyzer to a Horiba service station where it will be installed by a factory–trained technician.

Note▸▸▸ The SLFA–20 and SLFA–20T use the same software. If you install the ST–20 auto–sampling unit to your SLFA–20, there is no need to replace the ROM or reset dip switches.

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Product History

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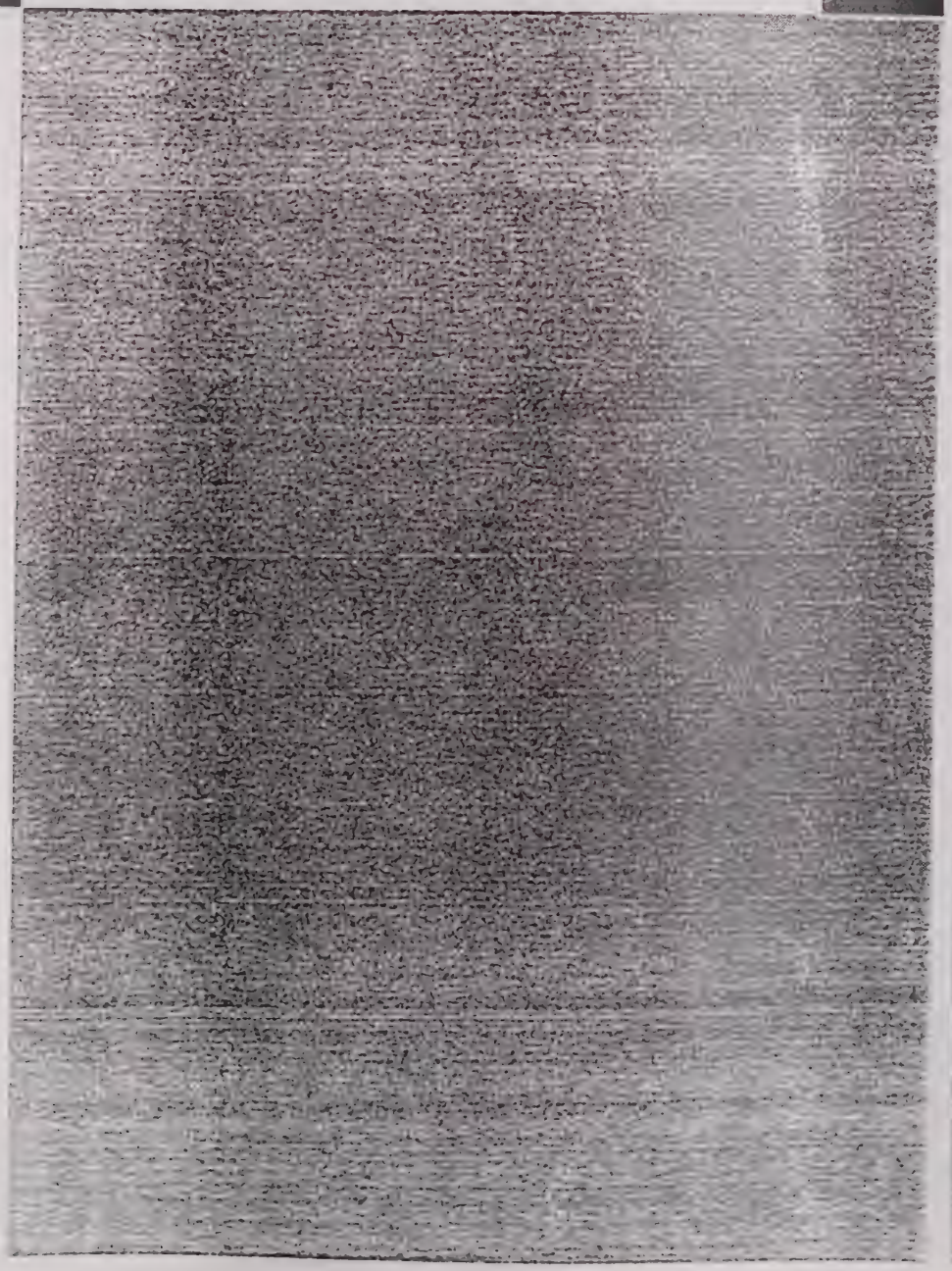
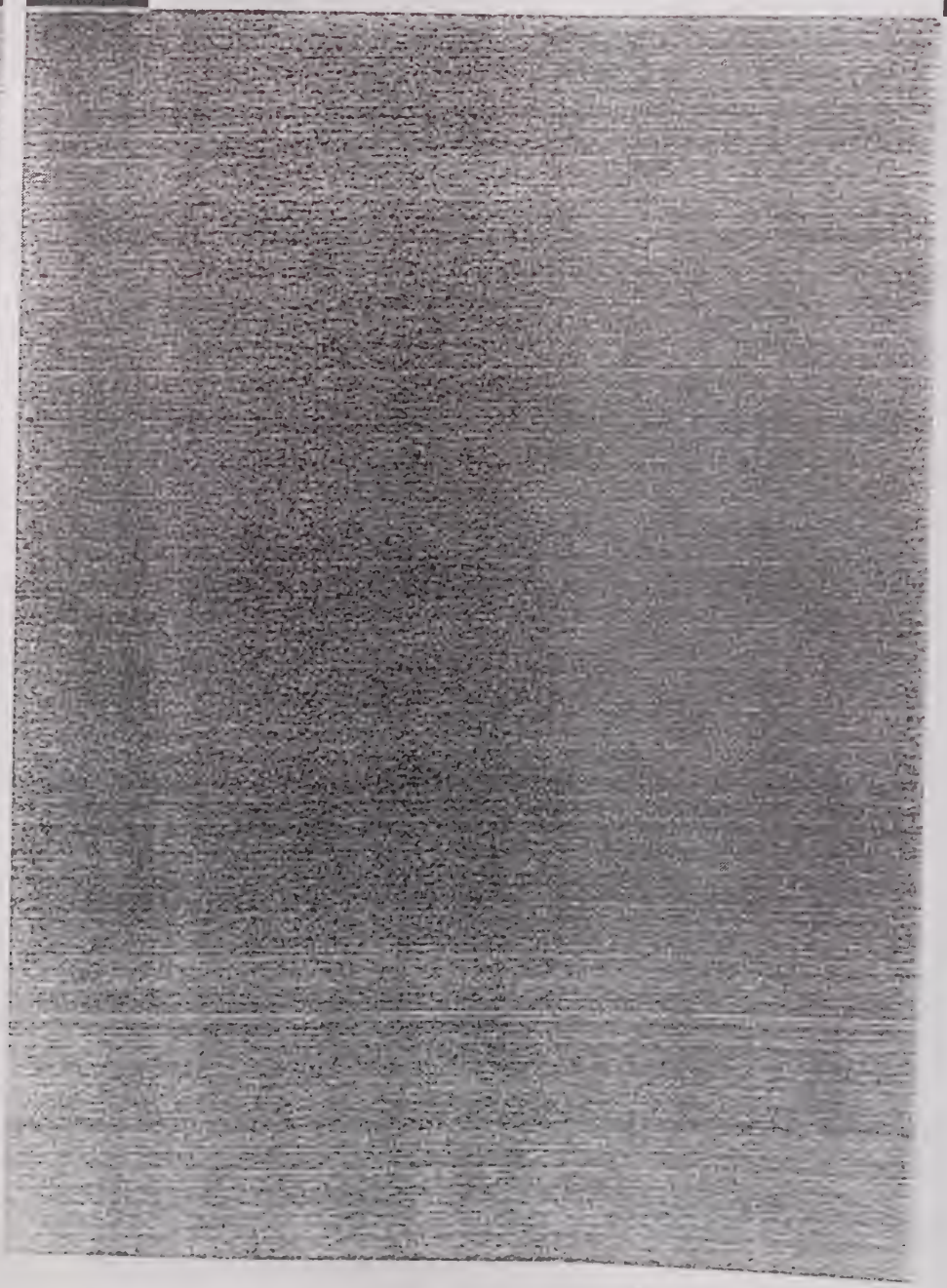
SAFETY FUNCTIONS



CHAPTER 1
SAFETY FUNCTIONS



1 SAFETY FUNCTIONS

Safety and Cautions When Using

Caution!

- The analyzer includes an X-ray generator and high voltage circuits. If you remove the cover or disassemble any components, be sure to refer to the repair manual for proper procedures.

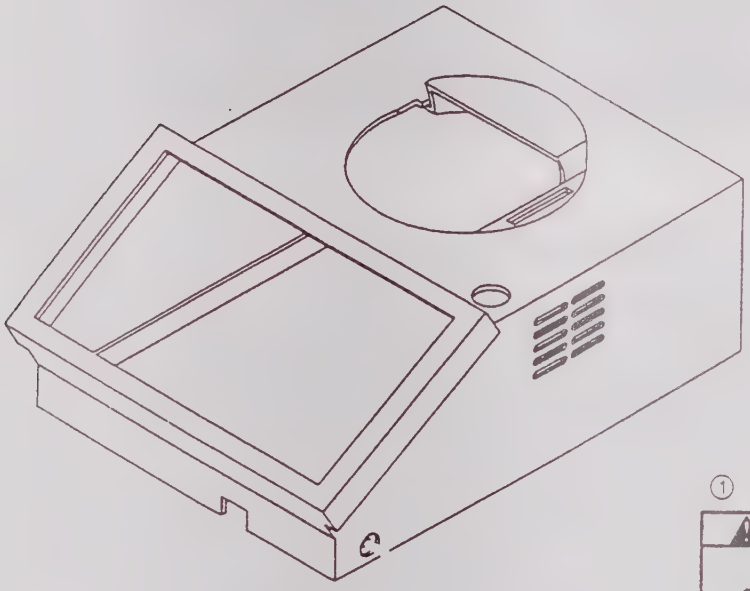
Disposing of components

- The X-ray and monitoring (comparative analysis) tubes used in the analyzer contain a beryllium membrane. As beryllium is a highly toxic substance, please understand its characteristics and be prepared to take appropriate countermeasures should an accident occur.
- To avoid the possibility of chemical spillage, fire, or explosion, the lithium battery used in the circuit board of the tester should not be recharged, taken apart, heated, or exposed to environments over 100°C. The contents of the battery should never be exposed to water.
- When disposing of the X-ray tube and sensor tube contained in the tester, please return them to the Disposal Section at a Horiba Service Center.

Registration of tester

- The laws of some countries state that environmental testers and other similar devices which pose a potential safety hazard to the workplace be registered with the appropriate local or national government agency. Ascertain if the tester must be registered in your country or region and take appropriate action.

1 SAFETY FUNCTIONS



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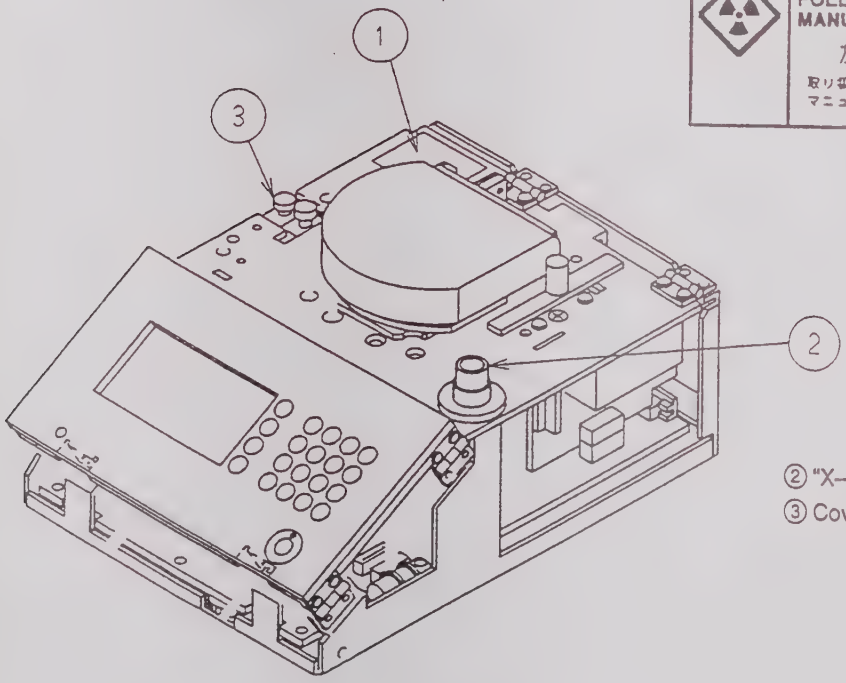
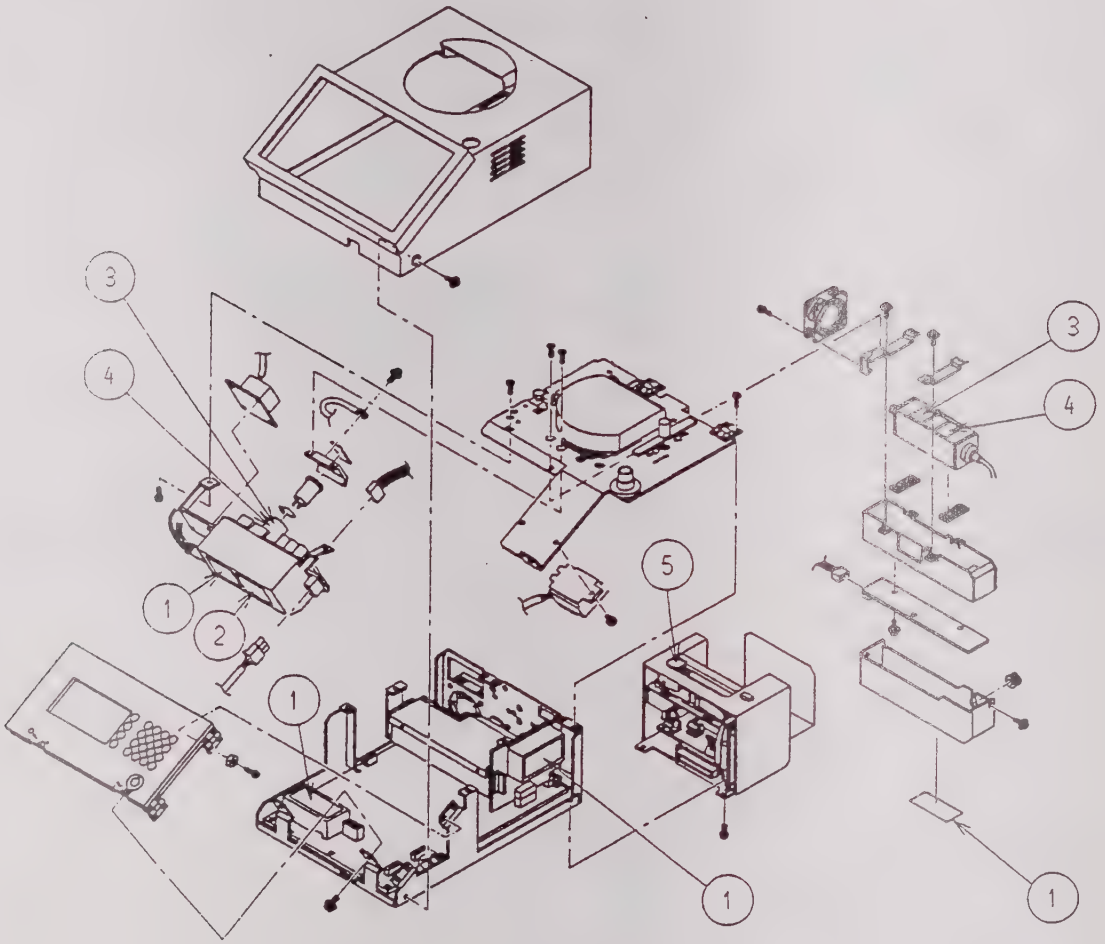


② "X-RAY ON" lamp
③ Cover switch

I042634100

1 SAFETY FUNCTIONS



SLFA-20

1 SAFETY FUNCTIONS

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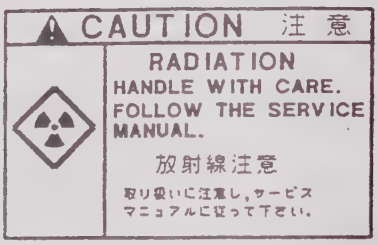

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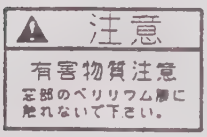

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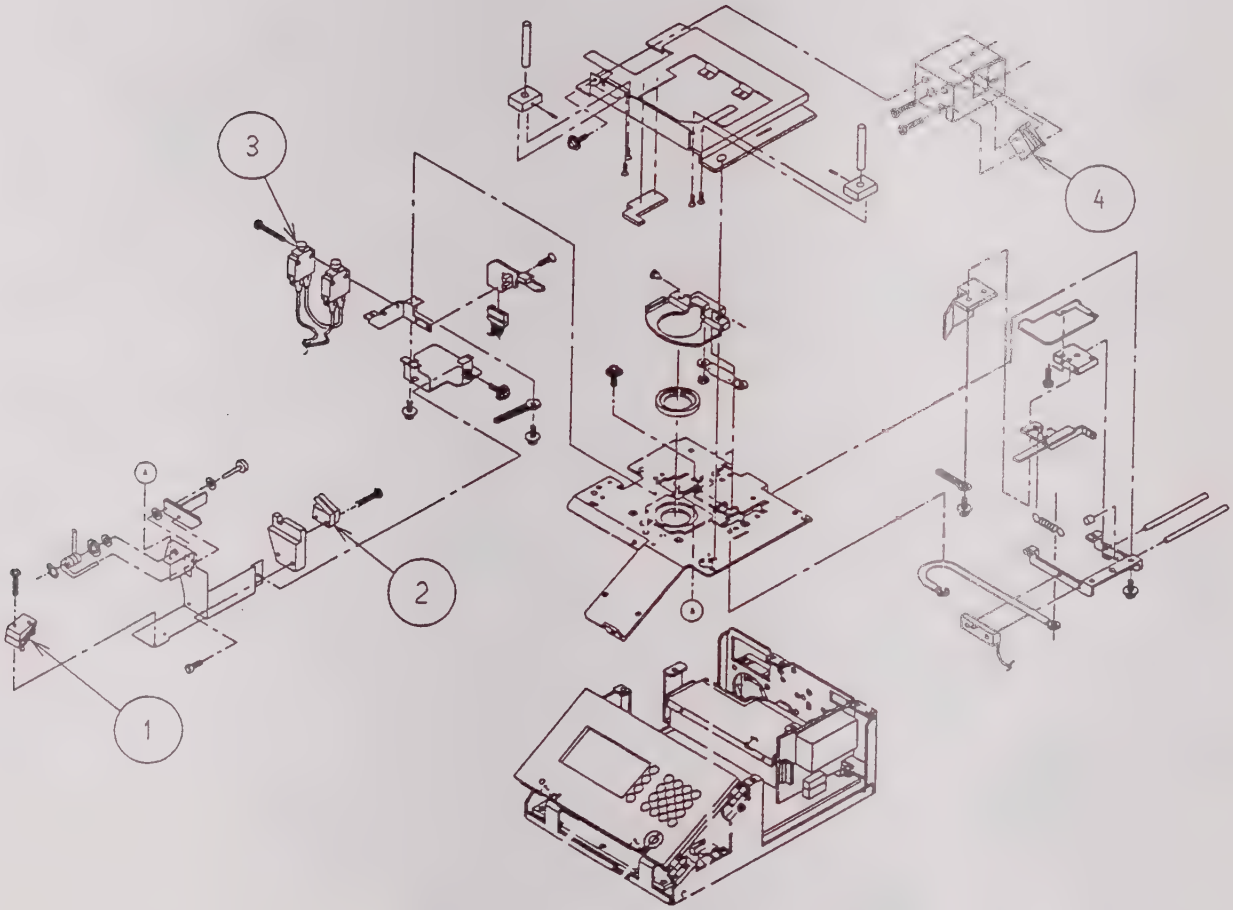
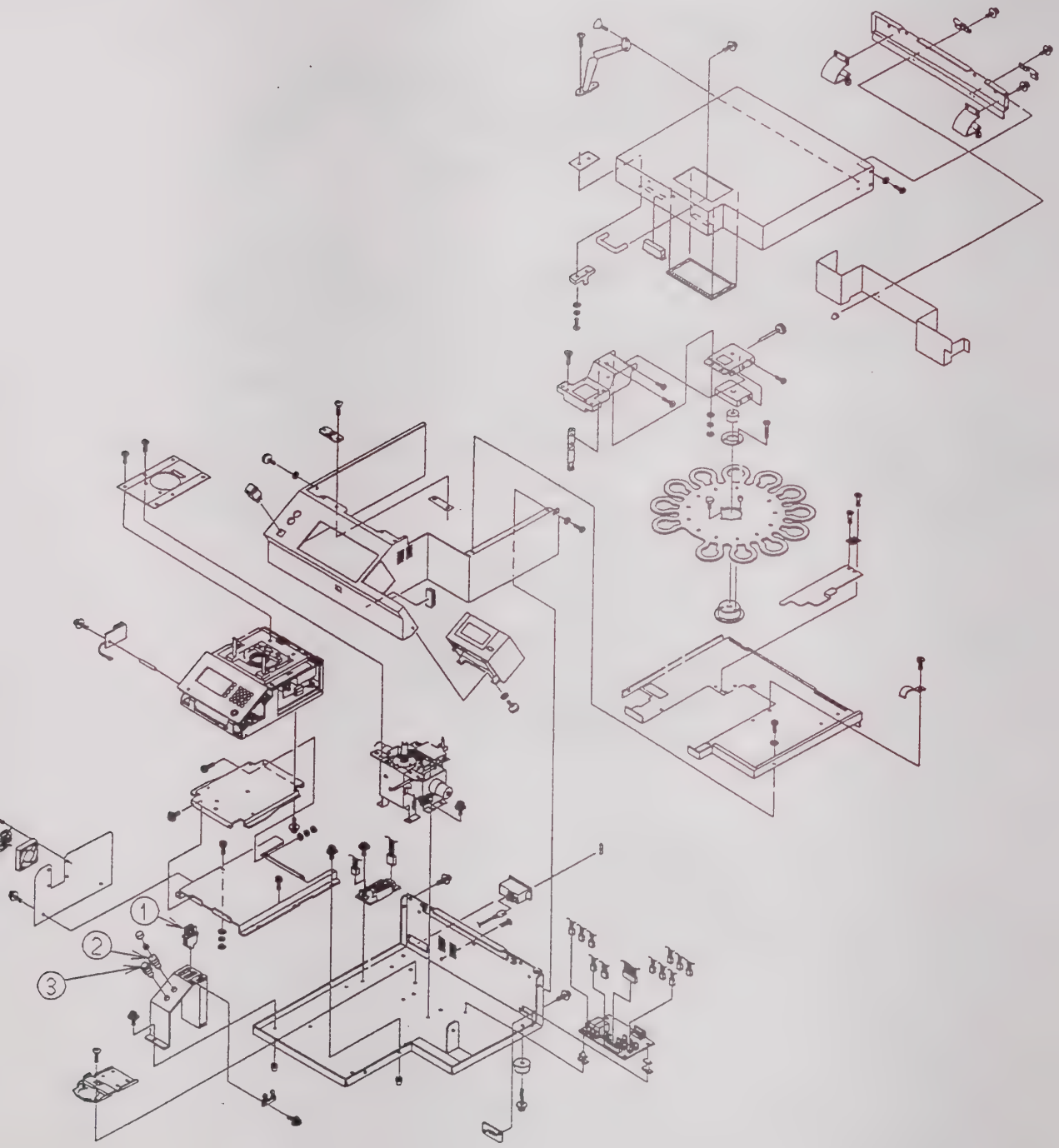
1 SAFETY FUNCTIONS



SLFA-20T

① Shutter close switch
② Shutter lock switch
③ SLFA-20 cover switch
④ Chamber cover switch

1 SAFETY FUNCTIONS



SLFA-20T

① Sampler cover down switch
② X-RAYS ON lamp
③ Sampler cover down lamp

1 SAFETY FUNCTIONS

X-Ray Shield and X-Ray Interlock (SLFA-20)

The following explains the X-ray shielding and X-ray interlock devices with regard to normal usage of the tester. If you disassemble the tester for repair or testing, please follow the X-ray precautionary instructions in the service manual to prevent the possibility of X-ray exposure.

X-Ray Shielding

Safety Specifications

The unit utilizes a 8kV/30mA X-ray generating tube which must adhere to the specifications listed in IEC1010-1 regulation 12.2 relating to wave emitting devices. While the IEC1010-1 regulations list a maximum allowable leakage rate of 5mSv per hour, Horiba uses a more stringent standard of 1mSv per hour.

X-Ray Protection

1 X-ray shields (unit cover, test chamber cover, X-ray shutter) consists of a sheet metal material over 0.5mm thick.

2 X-rays from the source components (target and Ti filter) should be reflected at least two times against metal shielding to prevent leakage outside of the tester.

Required Markings

X-ray emitting equipment must be marked as such (outside of IEC1010 specification). According to the 4th provision of the Japanese law concerning Structure and Requirements of X-Ray Equipment, the X-ray mark, X-ray tube specifications, date of manufacture, and manufacturer must be listed on the equipment.

Note▸▸▸ These requirements are applicable to equipment having a tube voltage of more than 10kV. While the SLFA-20 has an X-ray tube voltage of 8kV and falls under this requirement, this requirement is still listed in the interest of uniformity because it is used with the MESA-500 and other Horiba X-ray units.

Inspection

Each unit is tested for X-ray leakage before shipment. Leakage specification is less than 1μSv per hour.

X-Ray Safety Interlock

Design

1 The unit utilizes an X-ray safety interlock mechanism that offers the following features. The test chamber cover will not open unless the X-ray shutter is completely closed, and the X-ray shutter will not open unless the test chamber cover is completely closed. (**Ref.▸▸▸ Fig.1-2**)

2 The "X-RAY ON" lamp will illuminate to show that the unit is in a condition in which X-rays may be generated. It is best to assume that X-rays are being emitted when this lamp is on. The lamp goes off to indicate to the operator that X-rays are not being emitted. (**Ref.▸▸▸ Fig.1-1**)

Note▸▸▸ Note that X-rays cannot be emitted if the lamp is burned out or broken.

3 X-rays cannot be generated if the cover is removed. (**Ref.▸▸▸ Fig.1-1**)

1 SAFETY FUNCTIONS

- **Displays**

  1 A "DO NOT FORCE CHAMBER COVER OPEN" message is displayed on the X-ray shutter.

  2 The "X-RAY ON" lamp illuminates to show that X-rays are being generated or that the unit is in a condition in which X-rays will be generated.

  3 A "DO NOT REMOVE COVER" warning is listed on the cover near the screws.

- **Re-Start Protection**

  1 The X-ray shutter will close if the test chamber cover is opened. Manually close the test chamber cover to open the X-ray shutter. A restart is then allowed by the interlock mechanism.

  2 If the X-RAY ON lamp burns out, no X-rays can be emitted. Replacement of the lamp will allow X-rays to be emitted without the need for any other operation. A restart is then allowed by the interlock mechanism.

  3 Removal of the cover will activate an interlock safety switch that will prevent the generation of X-rays. Replacement of the cover will deactivate the interlock switch and allow X-rays to be generated. The cover switch incorporates a pull-on-lock feature which allows you to deactivate the interlock switch (switch goes ON) by pulling out the two actuators forcefully when doing maintenance work inside the unit. Because the cover is secured by M3 screws which prevent casual or inadvertent opening by operating personnel, any possible danger resulting from restarts by operating personnel is avoided.

- **Maintaining Safe Operation**

  1 The unit must be operated in a manner in which the safety standards (stated previously in items 1 through 3 of "Design" given above) can be maintained.

Note▸▸▸ To help assure safe operation, affix labels to the unit notifying operating personnel that they are not to attempt to disassemble the unit, operate the test chamber cover unnecessarily, or attempt to transport the unit with the test chamber cover open.

2 The X-ray shutter is designed to maintain safe and dependable operation for up to 201,600 cycles.

Note▸▸▸ In regard to operational dependability, "a device shall provide safe operation for at least two times the number of operations possible within its designated service life."

Maximum usage time in 1 day:	7,200 seconds
Time needed for 1 cycle:	100 seconds
Days utilized per year:	200 days
Designated service life:	7 years

7,200/100 x 200 x 7 x 2 = 201,600

1 SAFETY FUNCTIONS

3 The X–RAY ON lamp is an incandescent type which utilizes a filament as the light emitting element. If the filament breaks (lamp burns out), a relay connected in series with the filament will be triggered and power will be cut to the X–ray power circuit. This is why X–rays cannot be discharged if the X–RAY ON lamp is burned out.

The interlock relay (Omron G6A–234) is rated for over 100 million mechanical and 500,000 electrical cycles. The relay utilizes two sets of coils and contacts which allows one set to continue to activate the interlock even if the other set malfunctions. The relay activates when power is turned on, when the X–RAY ON lamp is replaced, and when the cover release interlock switch is put into its pull–on–lock mode.

Because the frequency of lamp replacement and manual override of the cover interlock switch are extremely small, the service life of the relay depends predominantly on the number of power–on power–off cycles the unit is subjected to.

Note▸▸▸ In regard to operational dependability, "a device shall provide safe operation for at least two times the number of operations possible within its designated service life." Relay service life is calculated as follows.

Power–on/off cycles in 1 day:	10 cycles
Days utilized per year:	200 days
Designated service life:	7 years

10 × 200 × 7 × 2 = 28,000 cycles (500,000 cycles allowable)
Safety is further enhanced because a break in wiring or in the printed circuit board will trigger an open system condition which activates the interlock and prevents X–ray discharge.

4 The cover interlock switch goes OFF when the cover is opened causing the interlock relay (wired in series with the cover switch) to go OFF and cut power to the X–ray generation circuit, thus preventing the X–ray generation when the cover is removed.

The cover interlock switch (Omron D2D–2000) has a rated service life of over 10 million mechanical and 100,000 electrical cycles. The relay utilizes two sets of coils and contacts which allows one set to continue to activate the interlock even if the other set malfunctions.

The switch operates only when the cover of the unit is removed for maintenance or test work. There should be no problem with this switch as it will be activated only a few times in the life of the unit.

Switches should be able to withstand at least 10,000 operating cycles, the interlock cover switch will provide dependable service.

Furthermore, because the peripheral circuits operate the same as 3 above, the interlock function can be assumed as having a high degree of reliability.

- Testing

The X–ray interlock safety function is fully tested at the time of shipment as listed in items the first three items of "X–Ray Safety Interlock" on page 1–9 and 1–10.

1 SAFETY FUNCTIONS

● X-Ray Safety Interlock Circuit

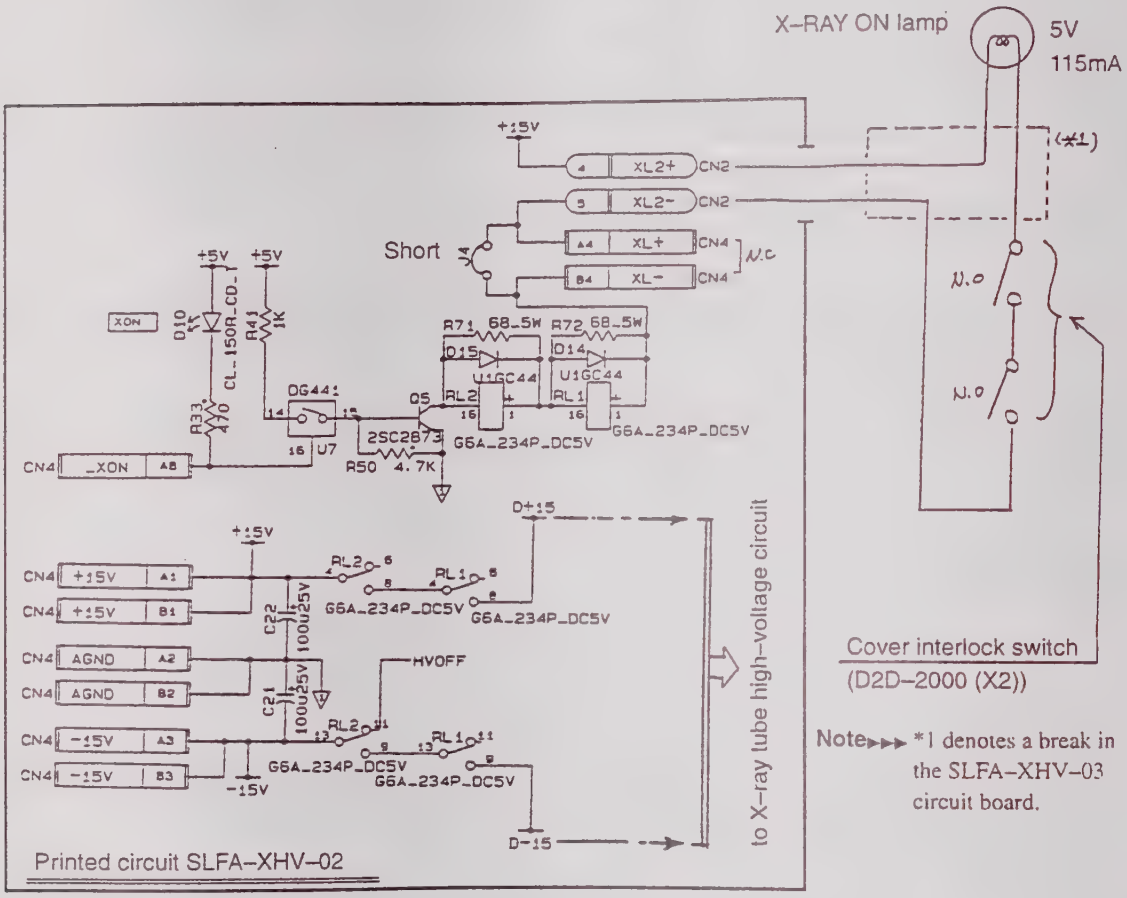
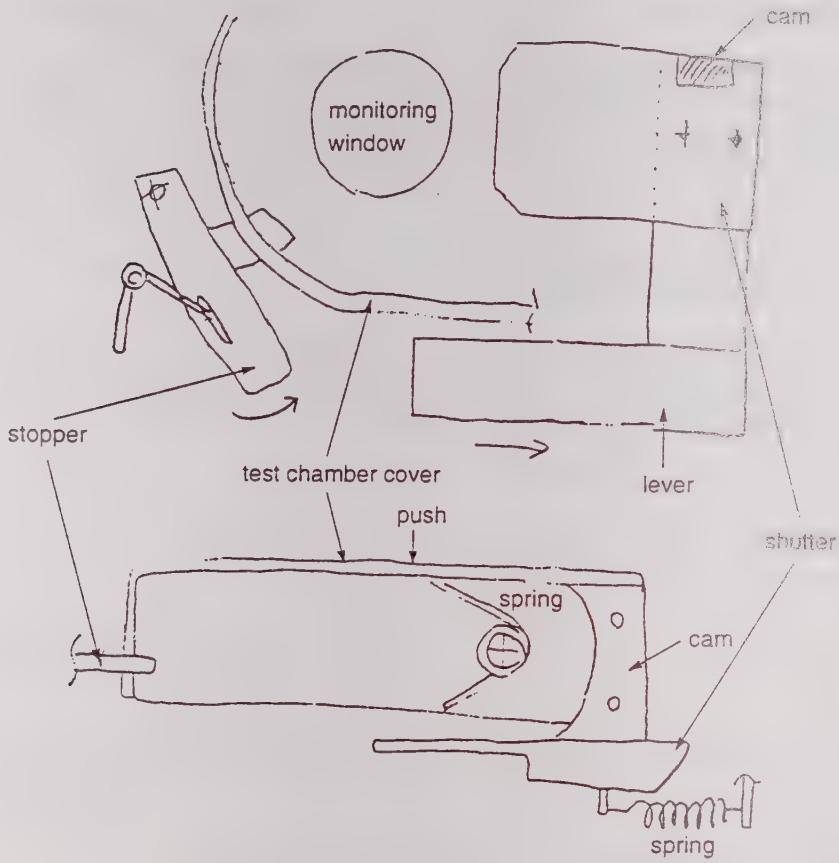


Fig.1-1 X-ray safety interlock circuit (SLFA-20)

1 SAFETY FUNCTIONS



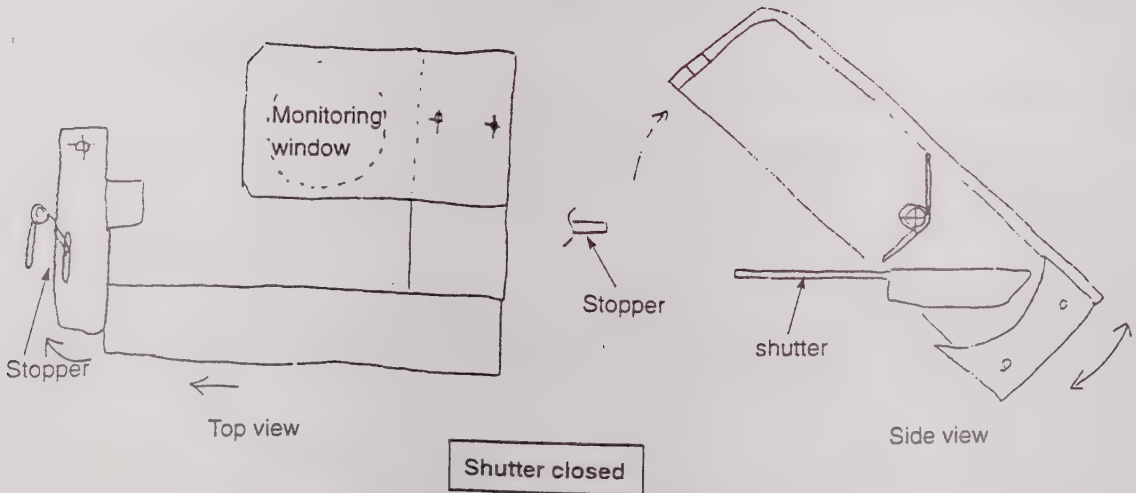


Fig.1-2 X-ray interlock mechanism

1 SAFETY FUNCTIONS

SLFA–20T Safety Features

A motor is used to open and close the shutter in the SLFA–20T unit. Normally, X–rays will not leak out of the unit because the shutter opens only when the chamber cover is in its lower position. Note, however, that this interlock function will not activate under the conditions listed below. If you encounter any of these conditions, please turn the power off quickly.

1 Turn power off quickly if the small window on the chamber cover is cracked, broken or missing.

Please use caution when performing maintenance on the analyzer. When instructing customers on proper usage of the analyzer, please tell them not to modify the analyzer in any way or remove any screws.

1 SAFETY FUNCTIONS

Auto-sampler interlock

When the sampler cover is opened, the auto-sampler stops. The operation works with a microswitch installed that detects whether the cover is open or closed, and when the cover is open, it cuts off the power supply to the sampler motor. The life of this microswitch is as follows: mechanical life = 1000k cycles; electrical life: 100k cycles.

Note▸▸▸ In regard to operational dependability, "a device shall provide safe operation for at least two times the number of operations possible within its designated service life." Service life is calculated as follows.

Number of cycle per day: 20 cycles
Days utilized per year: 200 days
Designated service life: 7 years
(20 (times) × 200 (days) × 7 (years) × 2 = 56,000 (times)
The electrical life of the microswitch will be 100,000 cycles (>56,000 cycles)
Also, the microswitch uses a cover that prevents you from turning it on without a tool, and if two are installed in line, you can ensure even greater safety.

X-ray shield and X-ray interlock

X-ray shielding and preventive measures: the prevention of lasers and other radiation and sonic and ultra-sonic pressures .

- **Safety Specifications**

The unit utilizes a 8kV/30mA X-ray generating tube which must adhere to the specifications listed in IEC1010-1 regulation 12.2 relating to wave emitting devices. While the IEC1010-1 regulations list a maximum allowable leakage rate of 5mSv per hour, Horiba uses a more stringent standard of 1mSv per hour.

- **X-Ray Protection**

1 X-ray shields (unit cover, test chamber cover, X-ray shutter) consists of a sheet metal material over 0.5mm thick.

2 X-rays from the source components (target and Ti filter) should be reflected at least two times against metal shielding to prevent leakage outside of the tester.

- **Required Markings**

X-ray emitting equipment must be marked as such (outside of IEC1010 specification). According to the 4th provision of the Japanese law concerning Structure and Requirements of X-Ray Equipment, the X-ray mark, X-ray tube specifications, date of manufacture, and manufacturer must be listed on the equipment.

Note▸▸▸ These requirements are applicable to equipment having a tube voltage of more than 10kV. While the SLFA-20 has an X-ray tube voltage of 8kV and falls under this requirement, this requirement is still listed in the interest of uniformity because it is used with the MESA-500 and other Horiba X-ray units.

1 SAFETY FUNCTIONS

- Inspection

Each unit is tested for X–ray leakage before shipment. Leakage specification is less than 1μSv per hour.

- X–ray safety interlock: X–ray protection provided by safety interlock .

- Design

This instrument is equipped with a safety interlock for X–rays as explained below.

Ref.▸▸▸ • Interlock construction
• Interlock wiring

1 If the chamber cover is not completely closed (shut down), the X–ray shutter will not open. (Mechanical interlock.)

- As the chamber cover lowers, the lock shaft attached to it also lowers.
- The lock shaft pushes down the stopper. (This allows the shutter to open.)
- Then the shutter passes through the lock shaft's groove.

2 If the X–ray shutter is not completely closed, the chamber cover cannot be raised. (Mechanical interlock.)

- If the shutter is open, the groove on the lock shaft attached to the chamber cover catches and the chamber cover cannot rise.
- If the shutter closes, the groove on the lock shaft attached to the chamber cover releases and the chamber cover is allowed to rise.

3 While the shutter close switch is off, if the chamber cover down switch is on and the shutter lock switch is not on, then X–rays will not be generated. (Electrical circuit interlock).

- If the sample chamber cover is removed while the shutter is open, then the X–rays will turn off.

4 The "X–RAYS ON" lamp will illuminate to show that the unit is in a condition in which X–rays may be generated. It is best to assume that X–rays are being emitted when this lamp is on. The lamp goes off to indicate to the operator that X–rays are not being emitted.

Note▸▸▸ That X–rays cannot be emitted if the lamp is burned out or broken..

5 X–rays cannot be generated if the cover is removed.

- Displays

1 A "DO NOT FORCE CHAMBER COVER OPEN" message is displayed on the X–ray shutter.

2 A "DO NOT INSERT YOUR FINGER OR A STICK INTO THE HOLE" message is displayed near the hole where the lock shaft enters to disable the safety function.

3 The "X–RAYS ON" lamp illuminates to show that X–rays are being generated or that the unit is in a condition in which X–rays will be generated.

4 A "DO NOT REMOVE COVER" warning is listed on the cover near the screws.

1 SAFETY FUNCTIONS

- Re–Start Protection

1 The X–ray shutter will close if the test chamber cover is opened. Manually close the test chamber cover to open the X–ray shutter. A restart is then allowed by the interlock mechanism.

2 If the X–RAY ON lamp burns out, no X–rays can be emitted. Replacement of the lamp will allow X–rays to be emitted without the need for any other operation. A restart is then allowed by the interlock mechanism.

3 Removal of the cover will activate an interlock safety switch that will prevent the generation of X–rays. Replacement of the cover will deactivate the interlock switch and allow X–rays to be generated. The cover switch incorporates a pull–on–lock feature which allows you to deactivate the interlock switch (switch goes ON) by pulling out the two actuators forcefully when doing maintenance work inside the unit. Because the cover is secured by M3 screws which prevent casual or inadvertent opening by operating personnel, any possible danger resulting from restarts by operating personnel is avoided.

- Reliability

1 The construction conditions described above are to be made so that normal daily operation does not disrupt them.

Note►►► Normal daily operation refers to operations performed by the operator with the instrument and does not refer to the operations given below. In addition, it must be displayed that the operator should not perform the following operations. Disassembly of the instrument with a screwdriver or other such tool.

2 The construction of the X–ray shutter shall be verified for reliability by performing repeated testing. (**Ref.►►►** the SLFA–20 risk assessment) For the SLFA–20T, the reliability of the safety features depends on the microswitch, but with a mechanical life of 30,000k cycles, and a electrical life of 3,000k cycles (current of 0.115 A) there is judged to be no problem. For further reliability, placing two microswitches in line, even if one malfunctions, the other one will operate the interlock.

Note►►► In regard to operational dependability, "a device shall provide safe operation for at least two times the number of operations possible within its designated service life." Service life is calculated as follows.

Number of cycle per day:	72 cycles
Days utilized per year:	200 days
Designated service life:	7 years

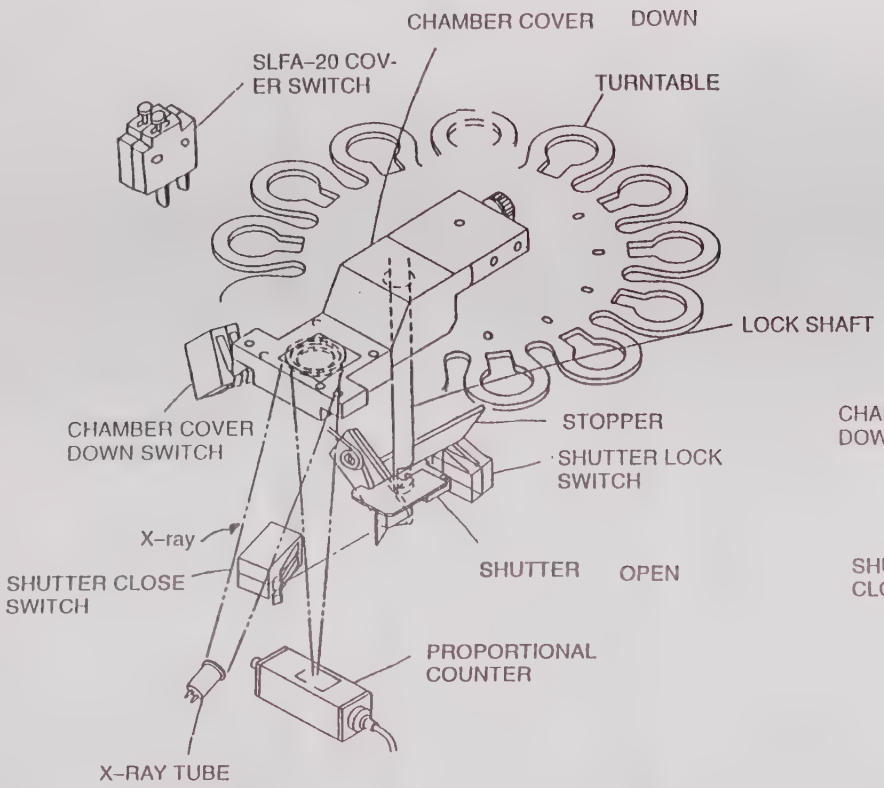
(72 (times) × 200 (days) × 7 (years) × 2 = 201,600 (times)
The electrical life of the microswitch will be 3,000,000 cycles (>201,600 cycles)

- Inspection

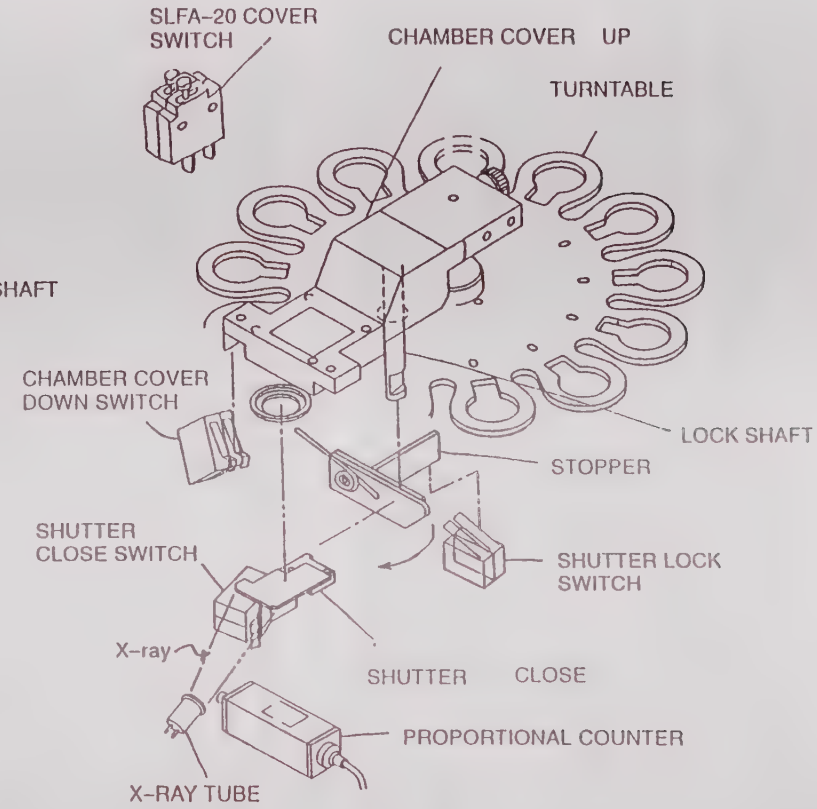
The X–ray interlock functions described above shall be performed for all instruments that are shipped.

● Interlock construction

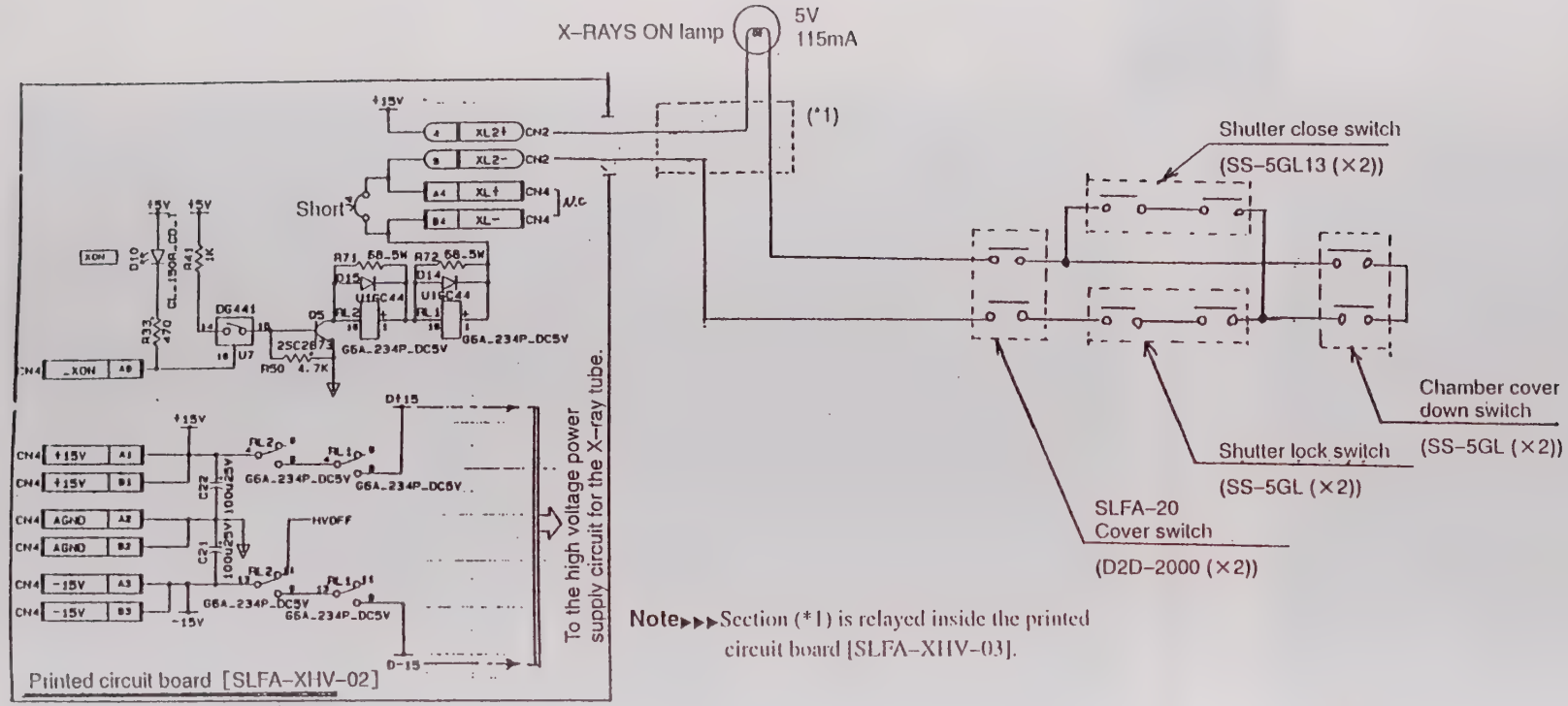
Shutter open and chamber cover down



Shutter closed and chamber cover up



● Interlock wiring



Note▸▸▸ Section (*1) is relayed inside the printed circuit board [SLFA–XHV–03].

Fig.1–3 X–ray interlock wiring

NOTE

CHAPTER 2
ERROR MESSAGES

CHAPTER 2
ERROR MESSAGES

2 ERROR MESSAGES

Error Messages

This table shows the printed out error displays and their corresponding meanings.

	Error Message	Description
1	AGC FAILED	The high voltage for the detector is abnormal.
2	BATTERY	The voltage of the memory back-up battery is insufficient. If this occurs, all data stored in memory will be lost; this includes the calibration curve, the date when calibration was prepared, the measuring conditions, and the clock. Inputting each data manually enables each measurement.
3	CAL# AUTO	Attempted to calibrate in the calibration curve automatic selection mode. Set the number (1 – 5) of the calibration curve to be calibrated on the CONDITION screen.
4	CAL FAILED	An error occurred during the calculation of a calibration curve. The data entered is inappropriate. The Auto-Gain Control (AGC) did not function.
5	CAL SAMPLE NUM	Insufficient number of standard value at automatic calibration or manual calibration (measurement value input) If the degree of calibration curve is 1 or auto (A), more than two standard values are necessary.
6	DATA CHECK	The data stored in memory is abnormal. If this error occurs, all the data will be lost.
7	DATE/TIME	The data stored in memory is abnormal. If this error occurs, all the data will be lost.
8	DETECTOR	To specify date and time, you attempted to specify an invalid value, e.g., the 13th month or 68 minutes.
9	DETECTOR VOLTAGE	The life of the detector has expired or the high voltage is abnormal.
10	NO CAL CURVE	Measurement was attempted without preparing a calibration curve.
11	NO SAMPLE	Measurement was attempted without preparing a sample.
12	SAMPLE CHAMBER OPEN	The sample-chamber cover is open. Check to make sure the lever is fully closed and not just positioned halfway.
13	SENSOR	The temperature sensor or air pressure sensor is abnormal.
14	X-RAY CURRENT	The target current of the X-ray tube is abnormal.
15	X-RAY OFF	No ON signal for X-ray.
16	X-RAY T VOLTAGE	The high voltage for the X-ray tube is abnormal.
17	X-RAY TUBE	The life of the X-ray tube has expired.
18	NO STD SAMPLE	No test sample in place when auto-correction runs.
19	SAMPLE UP/DOWN	Problem with turntable or shutter action.
20	TABLE ROTATE	Problem with turntable drive mechanism.
21	SAMPLER COVER OPEN	Sampler cover is open when analysis cycle starts.

Note▸▸▸ Items 18. 19. 20. and 21 only apply to model SLFA-20T.

2 ERROR MESSAGES

The occurrence time of the errors stated above is as follows:

ERROR No.	SITUATION
2 6	When the setting up the installation.
1 8 9 13 14 15 16 17	During measurement, automatic calibration and when starting each samples.
4 5	During automatic or manual (values are manually entered) calibration.
3 10 11	At the beginning of the measurement.
7	When setting the calendar and the timer.
12	At the beginning of the measurement, automatic calibration and spectral analysis. If the sample chamber door is open during one of these operations, they will be terminated.
19 20	Appear when turntable cycles (SLFA–20T only)
18	Appears during auto–correction (SLFA–20T only)
21	Appears at start of analysis, auto–correction, and spectrum analysis functions (SLFA–20T only).

2 ERROR MESSAGES

Error	1 AGC FAILED
COMMENTS	If the AGC does not start to operate during measurement and automatic calibration, the 'AGC FAILED' message will be printed at the output paper.
CAUSES	① There is no sample in the sample cell. ② The sample sensor indicates sample even there is no sample. ③ The spectrum form is abnormal. ④ The A / D and D / A converters at the [MCT-01] board are abnormal.
ACTION	① Check the sample. ② In the CHECK1 mode, check the operation of the sample sensor [SEN-01]. If there is a strong beam, the operation is abnormal. If there is a beam, check if there is a or direct beam on the sample. Replace the [MCT-01] board or [SEN-01] board. ③ Check the spectrum. ④ Check the [MCT-01] board A / D, D / A converters and readjust or replace them. After the replacement, adjust to zero, gain of the AMP at the [MCT-01] and [SPR-03] boards.

Error	2 BATTERY
COMMENTS	If the voltage at battery for the backup memory (supplied at the [MCT-01] board) falls below 2.7 V, the 'BATTERY' error message will be printed at the output paper.
CAUSES	① The battery voltage falls (new batteries are 3.6V). ② One of the connections between the battery, the CN3 of the [MCT-01] board may be in open circuit, or the connectors are faulty. ③ The connector in the connection between the battery and the [MCT-01] board is humid or there is some leakage. ④ The [MCT-01] board for the memory backup are damaged.
ACTION	① Check the voltage between the 1 to 3 pins at the battery 3-pin connector. If it is higher than 2.7 V, the battery is normal (a new one comes with 3.6 V). If it is lower than 2.7 V, replace the battery. ② Do a continuity test. ③ Check if there is some humidity at the connector and wipe it out. ④ Replace the [MCT-01] board.

Error	3 CAL# AUTO
COMMENTS	Calibration No. selection mistake.
CAUSES	Tried to calibrate with automatic selection mode #A.
ACTION	Set #(1 to 5) with CONDITION screen.

Error	4 CAL FAILED
COMMENTS	Error occurs during the calculation of the calibration.
CAUSES	Data entered is inappropriate.
ACTION	Correct the data and reenter it.

2 ERROR MESSAGES

Error	5 CAL SAMPLE NUM
COMMENTS	This error occurs if automatic or manual (values must be supplied) calibration is attempted without entering more than two standard value.
CAUSES	① Move than two standard value were not entered.(more than 3 when there are 2 orders) ② If the 'NO SAMPLE' message comes, the sample sensor indicates no sample even if there is one.
ACTION	① Enter more than two standard value.(more than 3 when there are 2 orders) ② Check the operation of the sample sensor with Check 1 Mode. .

Error	6 DATA CHECK
COMMENTS	When the voltage at battery for the backup memory is too low and the backup data becomes abnormal. Normally 'BATTERY' error message will be printed at the output paper before. This error message will be printed at the output.
CAUSES	① The battery voltage is low. ② One of the connections between the battery, the CN3 of the [MCT–01] board may be in open circuit, or the connectors are faulty. ③ The connector in the connection between the battery and the [MCT–01] board is humid or there is some leakage. ④ The battery circuits for the memory are damaged.
ACTION	① Check the voltage between the 1 to 3 pins at the battery 3–pin connector. If it is higher than 2.7 V, the battery is normal (a new one comes with 3.6 V). If it is lower than 2.7 V replace the battery. ② Do a continuity test. ③ Check if there is some humidity at the connector and wipe it out. ④ Replace the [MCT–01] board.

Error	7 DATE / TIME
COMMENTS	When setting the date and time, invalid values were entered, e.g. 13 month or 68 minutes.
CAUSES	Invalid values were used to set the date and time.
ACTION	Set the date and time with the proper values.

2 ERROR MESSAGES

Error	8 DETECTOR
COMMENTS	The SLFA–20's detector signal gain will fall after a long period of use. The detector voltage will correspondingly rise above the high–voltage power supply value listed on the detector and trigger an automatic gain control (this is termed AGC). As a result of this AGC function, if the voltage rises above 1,100V (the power supply voltage is controlled by the initial 1,000Vmx value), detector service life and X–ray fault errors are activated and printed out. If the high–voltage value exceeds 1,060V, a !!PC warning appears on the display.
CAUSES	① The detector life has expired. ② Faulty connection between the the X–ray tube and the high–voltage connector or high–voltage cable is broken.
ACTION	① If, even with the PC set to 1350 V, the B peak does not passes the B mark, replace the detector. ② If there is no spectrum with the PC set to 1000, 1025, 1050, 1075 or 1100 Volts, ③ Check the high–voltage unit ④ Check the amp. ⑤ Replace the detector.

Error	9 DETECTOR VOLTAGE
COMMENTS	The high–voltage supply of the detector is controlled by the CPU, and set by the PC (which ranges from 1000 V to 1100 V). If the difference between the PC and the voltage really supplied to the detector PV becomes bigger than ±50 volts, the 'DETECTOR VOLTAGE' error message is displayed at the output.
CAUSES	① The [XHV–02] board which supplies high voltage to the detector is faulty. ② Check the MCT–01 board* and replace it if necessary.
ACTION	① Check the [XHV–02] board and replace it if necessary. ② Check the MCT–01 board* and replace it if necessary.

Error	10 NO CAL CURVE
COMMENTS	A measurement is being attempted when an analysis curve hasn't been computed.
CAUSES	The calibration curve is not defined.
ACTION	Define the calibration curve.

Error	11 NO SAMPLE
COMMENTS	Even though an ID number has been set, the measurement cannot be executed due to the absence of a test sample.
CAUSES	① No sample is on the sample stand. ② If the 'NO SAMPLE' message comes, the sample sensor indicates no sample even if there is one.
ACTION	① Place the sample. ② Check sample sensor with Check 1 Mode.

2 ERROR MESSAGES

Error	12 SAMPLE CHAMBER OPEN
COMMENTS	The sample chamber cover is open. Open lever is not completely at the closed position and many be stopped at the halfway A sensor checks if the lever position is CLOSE, then checks if the shutter is OPEN. COVER CLOSED ⇒ SHUTTER OPEN COVER OPEN ⇒ SHUTTER NOT OPEN.
CAUSES	① The lever is not at the right position. ② Shutter open sensor is faulty.
ACTION	Check the operation and adjust the shutter open sensor.

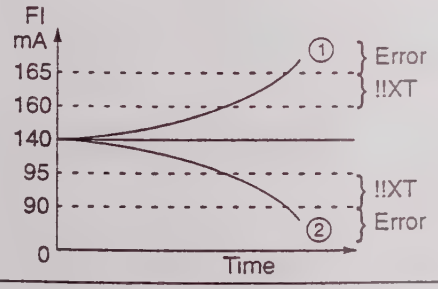
Error	13 SENSOR
COMMENTS	Abnormal thermal sensor, atmospheric sensor.
CAUSES	Check internal status with CHECK 1 mode. ① TM, below –24°C ⇒ Disconnection of thermal sensor (Normally, 25 to 10kΩ) ② TM, above 75°C ⇒ Short of thermal sensor (same as above) ③ AT is out of 600 to 1071 kPa ⇒ Faulty atmospheric sensor. ④ Faulty [MCT–01] besides ①, ②, ③.
ACTION	① Measure resistance of the both sides of the thermal sensor and replace if disconnected. ② Measure resistance of the both sides of the thermal sensor and replace if short circuited. ③ , ④ Check or replace [MCT–01]

Error	14 X–RAY CURRENT
COMMENTS	The X–ray tube current is normally adjusted to 30 μA. If this current goes out of the 25 to 35 μA range, the 'X–RAY CURRENT' error message is printed at the output.
CAUSES	The [XHV–02] board is faulty, or check the high voltage unit
ACTION	At CHECK1 mode check the X–ray tube current (XI). Check the high voltage unit , or replace The [XHV–02] board

Error	15 X–RAY OFF
COMMENTS	If, at the beginning or during the measurement or automatic calibration, no X–ray is generated, the 'X–RAY OFF' error message is printed at the output. Error message will not be displayed. The X–ray will not be generated during the measurement and auto calib. When starting up the installation is. the X–ray will be generated only after 30 seconds. Note►►►X–ray OFF means not to impressed voltage any high voltage to the X–ray tube.
CAUSES	① X–RAYS ON lamp is faulty ② Cover switch is off ③ The [XHV–02] board is faulty, or check the high voltage unit
ACTION	① Replace X–RAYS ON lamp ② Close the cover ③ Check the high voltage unit

2 ERROR MESSAGES

Error Display	16 X-RAY T VOLTAGE
COMMENTS	The high-voltage for the X-ray tube is normally set to -8 kV. If this voltage goes out of the -7.7 to -8.3 kV range, the 'X-RAY T VOLTAGE' error message is printed at the output, or if X-RAYS Lamp was gone out.
CAUSES	① The [XHV-02] board is faulty. ② High-voltage unit is faulty.
ACTION	① At CHECK1 mode check the voltage of the X-ray voltage (XH). ② Check the [XHV-02] board and replace it if necessary. ③ Check the high voltage, or high voltage unit replace

Error Display	17 X-ray Tube
COMMENTS	Items 1 and 2 listed below may occur after utilizing the unit for an extended length of time. ① Deterioration of in-tube vacuum Deteriorating vacuum will lower the thermionic emission rate and current consumption of the X-ray tube. Current consumption is rated at around 30mA, so the filament wattage must be increased to raise the thermionic emission rate and power consumption of the filament. ② Filament deterioration Deterioration of the filament is caused by a narrowing of the its cross section which increases electrical resistance. The unit uses an X-ray tube rated at 30mA, so an increase in resistance will change the thermionic emission rate which is determined by the filament wattage. An increase in resistance in the filament will increase current flow to the filament. Initially, current flow at the filament is around 140mA, but will change according to the conditions mentioned in ① and ② above. Normal filament current is from 95 to 160mA. A "!!XT" warning message will be displayed if filament current falls into the 90-95mA range, or rises into the 160-165mA range. An "X-RAY TUBE" warning will be displayed if filament current falls below 90mA, or increases beyond 165mA. 
CAUSES	① Faulty adjustment of XHV-03 current monitor circuit. ② Faulty high voltage unit on XHV-02. ③ X-ray tube is old.
ACTION	Verify FI with the check 1 mode. ① Check high-voltage power supply. ② " ③ Replace X-ray tube.

2 ERROR MESSAGES

Error Display	18 NO STD SAMPLE
COMMENTS	No test sample is present when the unit is attempting an auto correction (even if the standard value has been input).
CAUSES	A test sample has not been loaded. If this message appears when a sample is loaded, the sample sensor has malfunctioned.
ACTION	Load a test sample. Verify operation of the sample sensor in the CHECK 1 mode. A strong white light at the sample viewing window indicates a malfunction. Check that the light is not strong. Also, MDR-07 may need replacement.

Error Display	19 SAMPLE UP/DOWN
COMMENTS	Turntable or shutter has not moved within 5 seconds of command output from CPU. A SAMPLE UP/DOWN error will be printed out.
CAUSES	① Malfunctioning turntable or shutter mechanism. ② Malfunctioning motor (M2, M3). ③ Turntable UP/DOWN sensor or shutter sensor is malfunctioning or out of adjustment. ④ MDR-07 is malfunctioning.
ACTION	① – ③ Adjust or replace turntable sensor or shutter close sensor. ④ Verify MDR-07 and replace if necessary.

Error Display	20 TABLE ROTATE
COMMENTS	A TABLE ROTATE error will be printed out if the turntable has not begun rotation within 4 seconds of receiving command from the CPU, or if positioning time exceeds 10 seconds.
CAUSES	① Incorrect engagement of worm gear and wheel. ② Malfunctioning motor (M1). ③ MDR-07 or sensor is malfunctioning.
ACTION	① – ② Adjust turntable drive mechanism. ③ Adjust or replace MRD-07 or sensor.

Error Display	21 SAMPLER COVER OPEN
COMMENTS	This error message is printed out when the analysis, auto-correct, or spectrum analysis functions initiate with the sampler cover open. However, this error message will not be output if the cover is open while the above functions are in progress. Be aware that opening the sampler cover will stop the turntable, and closing it will start the turntable again.
CAUSES	① Sampler cover is open. ② The cover switch is malfunctioning when the SAMPLER COVER DOWN lamp does not go ON even though the sampler cover is physically closed.
ACTION	① Close sampler cover. ② Adjust position of cover switch or replace as necessary. MDR-07 may be malfunctioning.

2 ERROR MESSAGES

Abnormal Phenomenons without Error Messages

Power Switch

Error	Power switch does not function at all.
CAUSES	① Fuse ② Power Switch does not function due to misplacing the power transmission. ③ Faulty Power Switch. ④ Faulty Power Cord.
ACTION	① Fuse change. ② Check or replace the switching power ③ Replace Power Switch. ④ Replace Power Cord.

Error	Fuse blows often
CAUSES	① In Power Voltage is not the correct standard value.
ACTION	① Input regular input power voltage.

Front Panel

Error	LCD back light on the display does not go off even after 50 seconds after pressing the key.
CAUSES	Faulty [MCT-01] Board.
ACTION	Replace the [MCT-01] Board.

Error	LCD back light is dark or does not illuminate at all.
CAUSES	① Faulty Back light inverter. ② Faulty display module or its life.
ACTION	① Replace the [MCT-01] inverter. ② Replace the display LCD module.

Error	Blur on a Display Screen or characters are hard to read.
CAUSES	① Faulty or its life module on display. ② Faulty connecter on Contrast Adjusting Volume and [MCT-01] Board on Display.
ACTION	① Replace the display LCD module. ② Check wiring connections.

Error	Strange characters and strange line appears or no characters and line on Display Panel.
CAUSES	① Faulty module on Display Panel ② Faulty [MCT-01] Board.
ACTION	① Replace module on Display Panel. ② Replace [MCT-01] Board.

Error	Key does not function.
CAUSES	① Faulty Seat Switch. ② Faulty connection on Connection Cable between Seat Switch and [MCT-01] Board. ③ Faulty [MCT-01] Board.
ACTION	① Replace Seat Switch. ② Insert correctly. ③ Replace [MCT-01] Board.

2 ERROR MESSAGES

- Printer

Error	Paper is jamming.
CAUSES	① Paper is not loaded into printer correctly. ② Printer is malfunctioning. Printer head is not moving correctly.
ACTION	① Re-load paper. ② Clean the printer slide rail with alcohol and lubricate with grease (recommended grease is Dow Corning Molycote M-103 F023102200.

Error	Printer does not work.
CAUSES	① The printer head is scratching. ② Printer is not connected securely. ③ Faulty printer.
ACTION	① Clean the printer slide rail with alcohol and lubricate with grease (recommended grease is Dow Corning Molycote M-103 F023102200. ② Check if the connector is plugged out or the wire is broken. ③ Replace the printer.

Error	Characters are thin.
CAUSES	① Printer paper is different or incorrect. ② Printer is faulty.
ACTION	① Replace the printer paper (PN9038002000) ② Replace the printer.

Error	Imperfect printing.
CAUSES	① Printer is faulty. ② Printer driver is faulty. [EPTR-2001]
ACTION	① Replace the printer. ② Replace [EPTR-2001] ③ Wait 15 approx. seconds.

- **During Measurement, Calibration and Spectral Analysis.**

Error	Soon after the beginning of the measurement (including spectral analysis), the analyzer displays the READY screen.
CAUSES	① There is no sample [while measuring (only if the ID# was not entered) or spectral analysis]. ② There is a sample but the sample sensor is faulty and indicated no sample.
ACTION	① Put a sample in the proper place. ② Replace the sample sensor [SEN-01] or the [MCT-01] board.

Error	During measurement, calibration or spectral analysis, the analyzer displays the READY screen.
CAUSES	① The chamber cover is open (the OPEN / CLOSE lever is not well positioned). ② The shutter lock sensor is off (bad adjustment or faulty sensor).
ACTION	① Adjust the shutter. ② Adjust or replace the shutter lock sensor.

2 ERROR MESSAGES

Error	The analyzer locked at the screen for measurement.
CAUSES	Paper is jamming at the printer.
ACTION	Check if there is no paper jamming. Be sure to turn on the power switch after turning it off.

- **The analysis results**

Error	The measured values are abnormal.
CAUSES	① There is an oil leak or deformity in the sample cell. ② Oil splashed on the detector and protection membrane. ③ The sample is not set property at the measuring position.
ACTION	① Remake the sample cell. ② Wipe the oil out of the detector and check if the spectrum is within the normal range. Replace the membrane after operation. ③ Reset the sample.

Error	Poor repeatability.
CAUSES	S INT fell under 2000 cps ① Measuring spectrum with 1m/m% sample. ② Low current at the X–ray tube due to faulty high–voltage unit. ③ Faulty X–ray unit. S INT fell over 2000 cps ④ Noise or interference. ⑤ The sample cell is not well assembled.
ACTION	① Reassemble the detector at the right position. ② Replace or adjust the high–voltage unit. ③ Replace the X–ray unit. ④ Check the spectrum. ⑤ Assemble the sample cell at the proper position.

● SLFA–20 MAINTENANCE CHART

No.	Service Item	Frequency	Repair Facility	When Needed	Type of Service	Reference	Tools or Parts Needed	Facility Location	Exploded Drawing Location No.	Notes
1	Protective membrane replacement	Installation Daily Periodically If malfunctions	On–site or maker	When protective membrane cracks or becomes soiled.	Replace protective membrane.	Page 40 of service manual.	9038000200 cell window	On–site and take–out	S220013–(36) (37)	Analysis curve must be re–formulated when membrane is replaced.
2	Fan filter cleaning or replacement	Daily Periodically If malfunctions	On–site or maker	From once a week to once a month depending on local environment.	Clean filter. Replace if damaged.	Page 43 of service manual.	New filter (when replacing)	On–site and take–out	S220014 – 7	Clogged filter causes temperature rise that affects analysis precision.
3	Lamp replacement	If malfunctions	On–site or maker	When lamp filament breaks.	Replace lamp.	Page 42 of service manual.	9038001900 lamp set	On–site and take–out	S220013 – (39)	
4	Fuse replacement	If malfunctions	On–site or maker	When fuse blows. Repair cause of short circuit before replacing fuse.	Replace fuse.	Page 41 of service manual.	1A timed fuse (SLFA–20) 2A timed fuse (SLFA–20T)	On–site and take–out	S220013 – (39) S220046 – (31)	Fuse should not blow under normal conditions. Conduct a thorough check is fuse blows.
5	Spectrum check	Periodically If malfunctions	Maker	When replacing X–ray or comparative tubes. Also must be checked Periodically.	Check spectrum: 1) 1m/m% spectrum 2) water spectrum 3) noise spectrum	See section on "spectrum check" in maintenance mode.	Heavy oil test sample (1m/%) tap water	On–site and take–out		
6	Internal condition check (CHECK1 mode)	Periodically If malfunctions	Maker	Check when unit malfunctions or when components have been replaced. Check periodically.		See section on "internal condition" check in maintenance mode.	Tap water	On–site and take–out		
7	AGC check	Periodically If malfunctions	Maker	When replacing comparative tube or circuit board. Check periodically.		See section on "AGC" check in maintenance mode.	Tap water	On–site and take–out		
8	Sample position check	Installation Periodically If malfunctions	Maker	Check whenever maintenance is performed on unit.	Set sample position according to Fig.2–1 .	See section on setting test samples for SLFA–20T.	Test sample cell	On–site and take–out		Check all positions from 1 through 12.

No.	Service Item	Frequency	Repair Facility	When Needed	Type of Service	Reference	Tools or Parts Needed	Facility Location	Exploded Drawing Location No.	Notes
9	X-ray tube replacement	If malfunctions	Maker	When X-ray tube breaks or wears out.	Replace X-ray tube.	See X-ray tube replacement section in service manual.	X-ray tube, grease (SH4)	On-site and take-out	S220012 – (16)	Take precautions against high-voltage shock and exposure to X-rays. Always use insulated grease (SH4) (F022925600).
10	Comparative tube replacement	If malfunctions	Maker	When comparative tube breaks or wears out.	Replace comparative tube.	See comparative tube replacement section in service manual.	Comparative tube, silicone rubber (SE9188RTV)	On-site and take-out	S220012 – (12)	Take precautions against high-voltage shock and exposure to X-rays. Always use silicone grease (SE9188RTV) (F022925500).
11	printer replacement	If malfunctions	Maker	When print cannot be repaired.	Replace printer.	Make a test printout.	Printer	On-site and take-out	S220015 – (16)	Continual printer problems may indicate a high dust-content environment.
12	Grease lubrication	If malfunctions	Maker	When shutter and/or chamber cover do not move smoothly.	Apply organic molybdenum grease (#1800) to shutter guide rail.	Check shutter operation.	F022612500 (#1809)	On-site and take-out	S220013 – (4)	Clean with alcohol before greasing.
13	Grease lubrication	Periodically If malfunctions	Maker	When shutter and/or chamber cover do not move smoothly.	Apply Teflon grease to test sample cover support rivet.	Check shutter operation.	F022480700 (HP-300)	On-site and take-out	S220013 – (23), (27)	Clean with alcohol before greasing.
14	Grease lubrication	Periodically If malfunctions	Maker	When chamber cover stopper does not move smoothly.	Apply Teflon grease to stopper support rivet.	Check shutter operation.	F022480700 (HP-300)	On-site and take-out	S220013 – (223)	Clean with alcohol before greasing.
15	Grease lubrication	Periodically If malfunctions	Maker	When paper does not feed properly. When printer head does not move smoothly.	Grease printer head slide rail.	Make a test printout.	F023102200 (YM-103)	On-site and take-out	S220015 – (16)	Clean with alcohol before greasing.

No.	Service Item	Frequency	Repair Facility	When Needed	Type of Service	Reference	Tools or Parts Needed	Facility Location	Exploded Drawing Location No.	Notes
16	Insulator compound application	If malfunctions	Maker	When replacing X–ray tube.	Apply insulator compound to X–ray glass.	See X–ray tube replacement section in service manual.	F022925600 (SH4)	On–site and take–out	S220012 – (16)	Clean with alcohol before greasing.
17	Grease lubrication	Periodically If malfunctions	Maker	When turntable mechanism works erratically.	Grease worm gear and worm wheel.	Check turntable action.	Grease F022334200 (NSK Grease No.2)	On–site and take–out	S220059 – (22), (25)	Only SLFA–20T

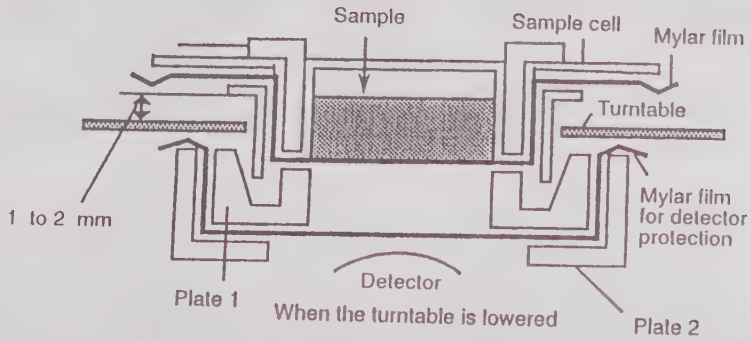
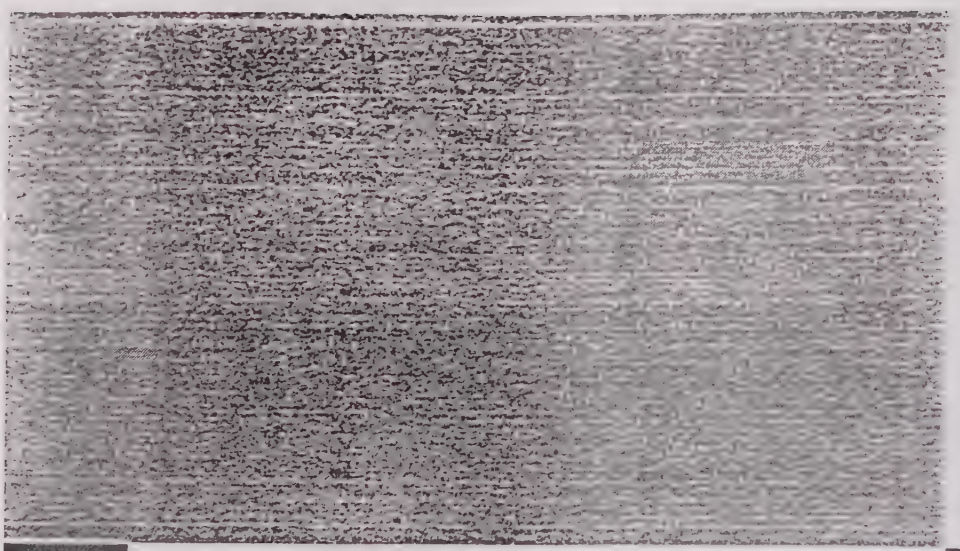
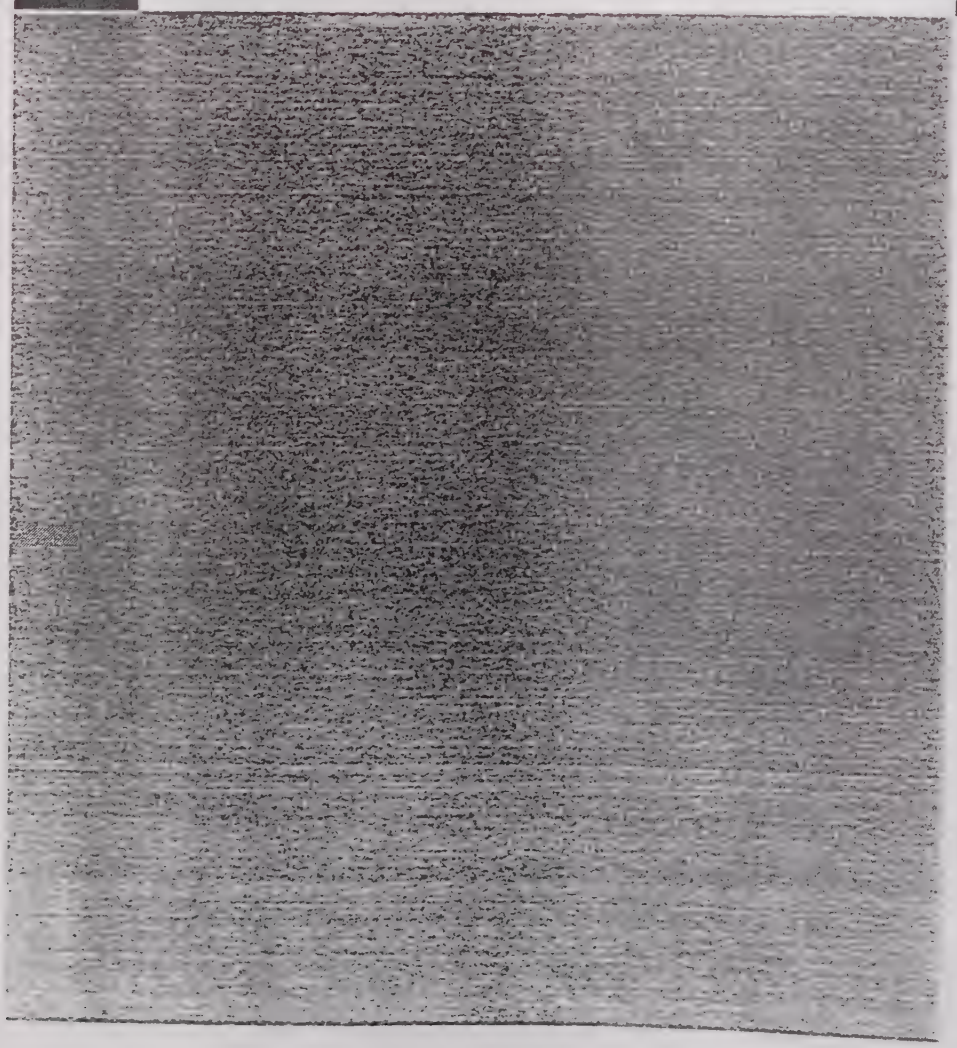


Fig.2–1

CHAPTER 3
MAINTENANCE MODE



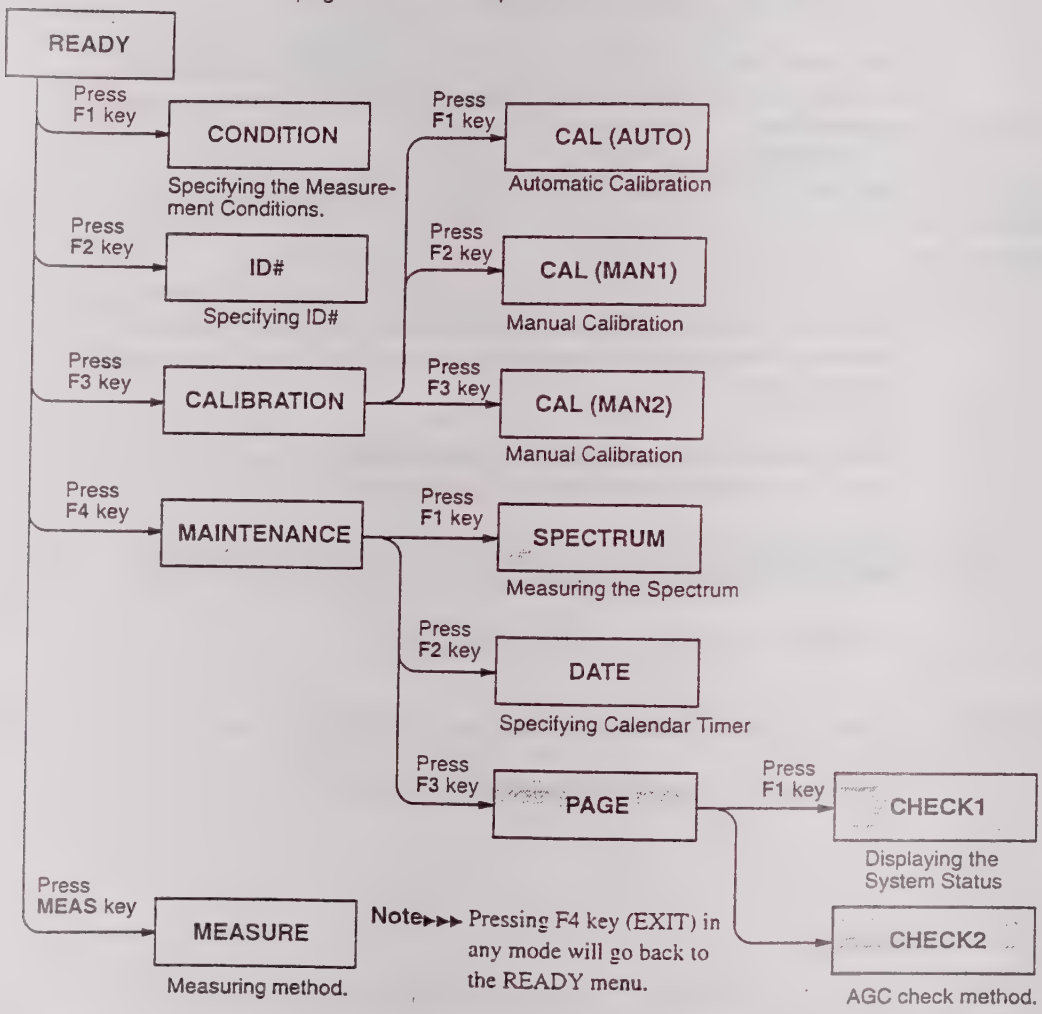
CHAPTER 3
MAINTENANCE MODE



3. MAINTENANCE MODE

Maintenance Mode

The basic flow of the Analyzer is diagramed below. The shaded parts are the pages which will explained in the Manual.



- Mode for the serviceman

After power is turned on, press the [8], [1], [2], [1], and [ENT] keys on the numerical keypad within 10 seconds and the maintenance screen will appear.

S.MAINTENANCE

3. MAINTENANCE MODE

● Measuring the Spectrum

Note▸▸▸ Here is the explanation for the SLFA-20. For information regarding the SLFA-20T, refer to the instruction manual.

CAUTION

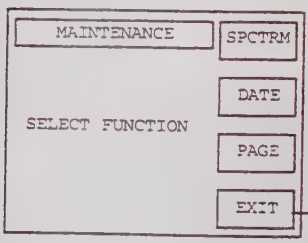
This measurement should be carried out if the Analyzer does not function properly. When it is hard to perform measurements smoothly, contact our service representative.

WARNING

Many samples are inflammable. Keep samples and unit away from flame.

CAUTION

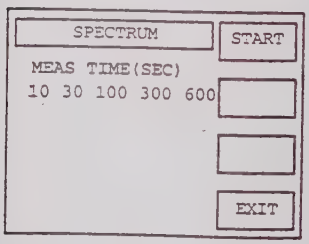
As soon as the measurement is complete, take out the sample cell from the unit. The analyzer filled with inflammable vapor may catch fire. Specially, be careful about high volatile sample.



1 Put the sample cell for which you are carrying out the spectrum measurement: For setting the sample cell, refer to the appropriate section.

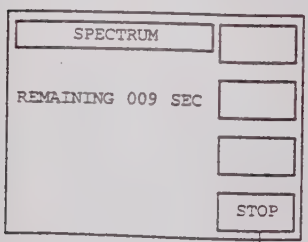
2 When the **MAINT** key, F4, is pressed with the READY menu displayed, the MAINTENANCE menu will appear.

*Pressing the **EXIT** key, F4, will return to the READY menu.*



3 Pressing the **SPCTRM** key, F1, will display the SPECTRUM menu.

4 Using the ▶ key, select the desired measurement time.



5 Pressing the **START** key, F1, will start measurement with the remaining time displayed.

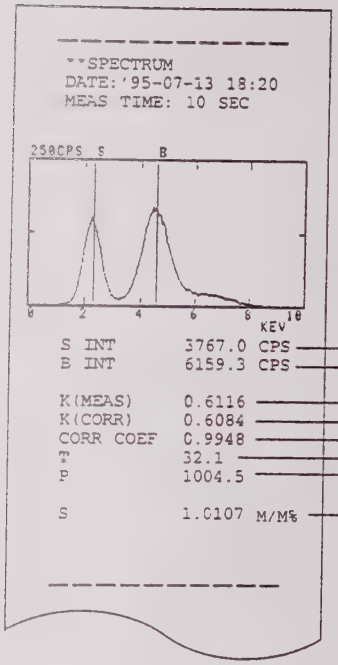
*During the measurement, Pressing the **STOP** key, F4, will stop the measurement and return to the READY menu.*

3. MAINTENANCE MODE

6 Upon completion of the measurement, a spectrum is printed out and then various data sets are also printed out as shown at left. These values are used to check the Analyzer when there is something wrong with the Analyzer. The temperature shown here may be different from room temperature because it is measured in the Analyzer. This difference is not abnormal.

Notes ▸▸▸▸
- Do not pull out the printer paper while printer is working.
- After data is printed out, press the PAPER FEED button to feed the printer paper. Do not pull out the printer paper.

The vertical axis scale of the spectrum varies in accordance with the maximum value of the spectrum. In normal operation, this is 250 cps. When the maximum value exceeds 250, it becomes 500. If it exceeds 500, it becomes 1000.



Contents of spectrum data

S INT 3767.0 CPS	Count rate of "S"
B INT 6159.3 CPS	Count rate of "B"
K(MEAS) 0.6116	Measured value of K (= S/B)
K(CORR) 0.6084	Value of "K" corrected with temperature and atmospheric pressure
CORR COEF 0.9948	Corrective coefficient for "K"
T 32.1	Temperature (°C)
P 1004.5	Atmospheric pressure (hPa)
S 1.0107 M/M%	Concentration

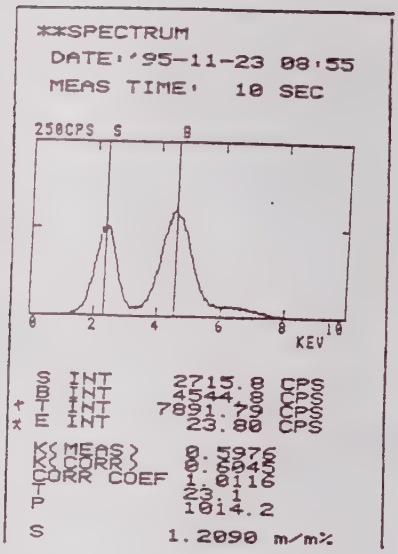
7 The screen will automatically return to the READY menu when this measurement is completed.

3. MAINTENANCE MODE

In the same way as the previous analysis was performed, conduct a 10-second analysis for a 1% sulfur weight density (standard test sample) and 0% weight density for water. Check the results of each test.

1) 1% weight spectrum

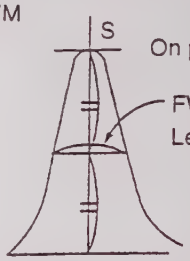
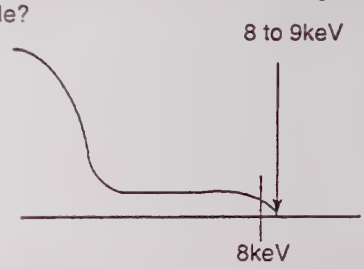
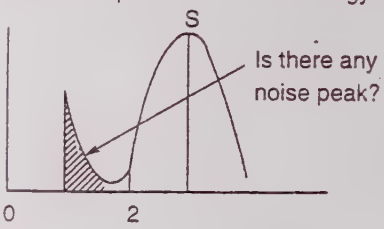
Notes ▸▸▸▸ The asterisks in front of T-INT and E-INT in the printout sample at left denote that the INT DATA PRINT function is ON in the S.MAINTENANCE mode. Normally, these two items will not print.



- S-INT is a calculation between 1.44 and 3.16 keV.
  B-INT is a calculation between 3.20 and 5.84 keV.
  T-INT is a calculation between 0 and 10.24 keV.
  E-INT is a calculation between 8.00 and 10.24 keV.
  The S line is at 2.32 keV.
  The B line is at 4.56 keV.

Check Items	Action
① Are there peaks on each Marker S and B?	① If there is no marker on the position, set the measurement condition on once every 10 seconds and measure with pressing the measurement key (Normal measurement over).Then do the spectrum measurement one more time. **Note▸▸▸** In the case of spectrum measurement, normally does not use AGC. Therefore, it is necessary to define correct PC after AGC. The measurement is for this purpose. (Normal finish)
② Is S INT above 2000cps? ③ Is K (MEAS) between 0.5 to 0.7? ④ T INT above 650000cps?	②, ③, ④ Check Nb Filter for detector, detector installing position, relation between X lines and high voltage unit.

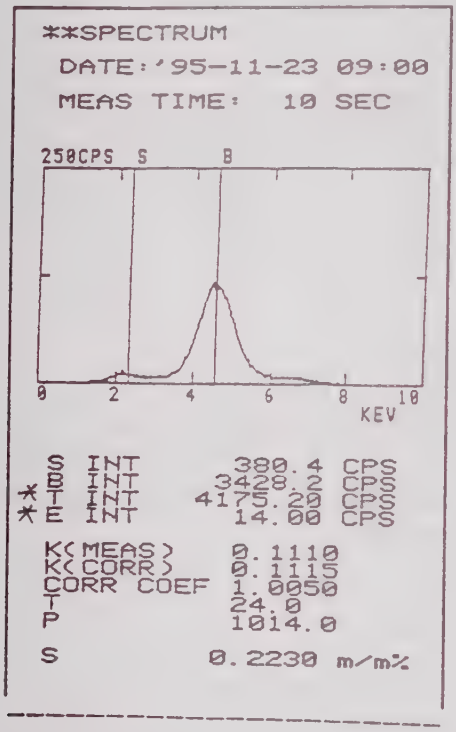
3. MAINTENANCE MODE

Check Items	Action
⑤ FWHM 	⑤ Loud Noise. Check [SPR–01] Board. Check if the [SPR–01], [SHV–01] mounting screws are tightly fastened.
⑥ A break between spectrum on High Energy side? 	⑥ Faulty X–ray Tube High Voltage. Check high voltage unit board.
⑦ Is there a noise peak on the Low Energy side? 	⑦ Loud Noise. Check [SPR–03] board. Check Noise Spectrum.

- 0wt% Spectrum

Use faucet water as a sample. 0wt% sample is also available.

Note▸▸▸ The asterisks in front of T-INT and E-INT in the printout sample, below, denote that the INT DATA PRINT function is ON in the S.MAINTENANCE mode. Normally, these two items will not print.



Check Items	Action
Is the S INT value 1/4 of the S INT value of [1] 1wt% spectrum ?	Is there any wrinkle on a Nb filter ?
If S INT is above 500 cps, X-ray will be irradiated to a Nb filter on detector and fluorescence X-ray will be irradiate directly to a detector, then S INT will be down. (L line of Nb is 2.16 keV and is almost equivalent to the value of K line (2.3keV) of S. S INT becomes above regulated value when Nb is miscount)	Check installing position of X-ray tube collimator.

- Noise Spectrum Test

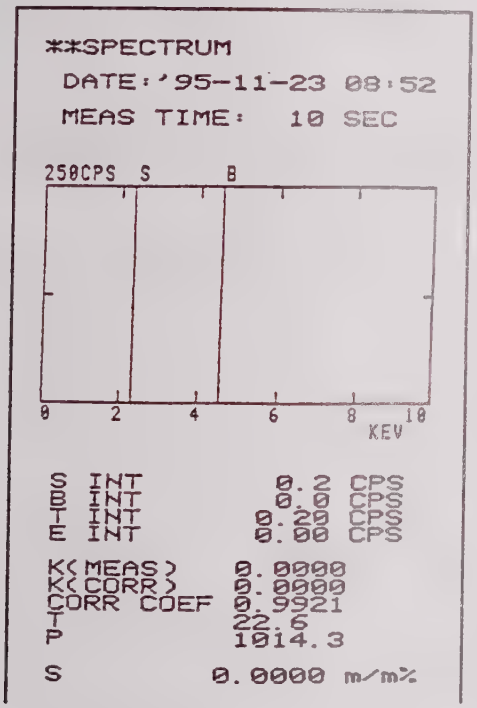
This test must be undertaken when the sample holder is changed. When the X–RAY ON lamp has been removed, X–rays cannot be generated so fluorescent X–rays will not irradiate the sample holder. If a spectrum analysis is run under this condition, only electric noise will be measured.

1 Turn on the INT DATA PRINT function in the S.MAINTENANCE mode.

2 Wait for the READY screen to appear.

3 Remove the X–RAY ON lamp, and run a spectrum analysis as described in step 2 above.

4 When the test is finished, turn power OFF and replace the X–RAY ON lamp.

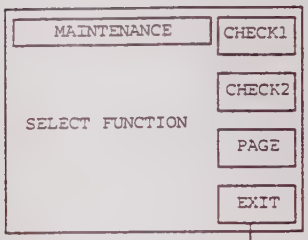


Check Items	Action
Is S–INT less than 3cps? Is B–INT less than 3cps? Is T–INT less than 10cps? Noise will increase if there is a high–pressure leak from the sample holder's high–pressure chamber, cable, or cap. T–INT will exceed 10cps if this occurs.	Wipe down the sample holder's high pressure chamber and cable with alcohol. Do not touch these parts with your bare hand.

3. MAINTENANCE MODE

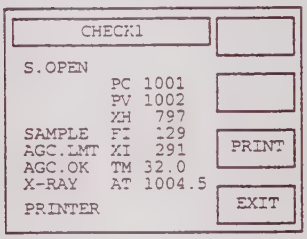
● Displaying the System Status–CHECK1 (SLFA–20 only)

CAUTION This checking should be carried out if the Analyzer does not function properly. When it is hard to perform checking smoothly, contact our service representative.



Pressing the EXIT key, F4, will return to the READY menu.

1 When the **PAGE** key, F3, is pressed with the MAINTENANCE menu displayed, the MAINTENANCE menu will change as shown below.



Figures shown here are an example only. They have no special meanings.

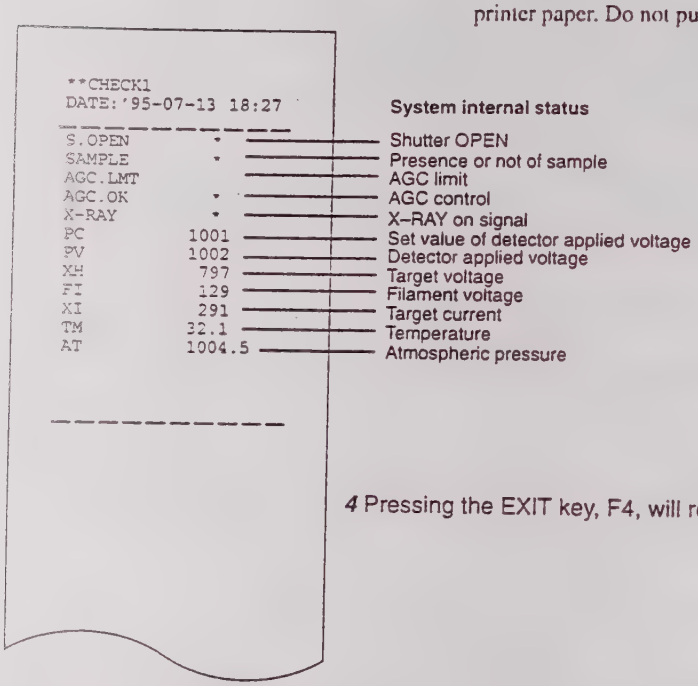
2 Pressing the **CHECK 1** key, F1, will display the CHECK1 menu and the system internal status.

3. MAINTENANCE MODE

3 Pressing the PRINT key, F3, will print out the System Internal status. This unit of condition is asterisked when print out.

Notes ►►►• Do not pull out the printer paper while printer is working.

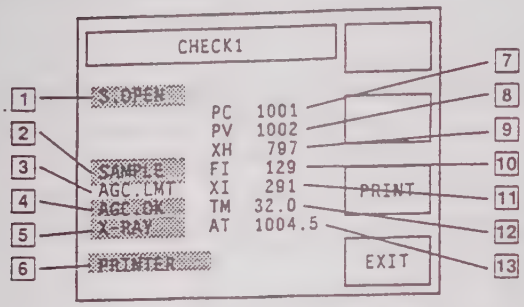
- After data is printed out, press the PAPER FEED button to feed the printer paper. Do not pull out the printer paper.



4 Pressing the EXIT key, F4, will return to the READY menu.

Figures shown here are an example only.
They have no special meanings.

3. MAINTENANCE MODE



No.	Display Indicator	ON (when grayed out)	OFF (when not grayed out)
1	S.OPEN (shutter open)	Shutter is completely open.	Analysis cannot be conducted.
2	SAMPLE (presence of sample)	A test sample is in the test chamber.	Analysis cannot be conducted. (including the special analysis)
3	AGC.LMT (AGC limit)	AGC circuit has exceeded the control range. AGC FAILED error message printout will be output when this indicator appears.	
4	AGC.OK (AGC control)	Auto gain control is functioning correctly. Analysis starts when this indicator goes ON.	
5	X-RAY (X-RAY On signal)	X-rays are being emitted.	X-RAY OFF error message is printed out.
6	PRINTER (printer is connected)	Printer is connected and printouts are possible.	When the printer is disconnected, it will become grayed out. Measurement can still be carried out in this condition.

No.	Display Indicator	Correct Range	Warning Display	Printout
7	PC (set value of applied voltage to sample holder)	less than 1060 (less than 1060 V)	Sample holder service life warning indicator (!!PC) will go ON between 1100 – 1060 (1100 – 1060 V).	DETECTOR error message will be printed out over 1100 (1100 V).
8	PV (applied voltage to sample holder)	PC ± 50 (PC ± 50 V)		DETECTOR VOLTAGE error message will be output if voltage difference with PC is more than ± 50 V.
9	XH (X-ray tube target voltage)	770 – 830 (–7.7 to –8.3kV)		X-RAY T VOLTAGE error message will be output is voltage falls out of range at left.

3. MAINTENANCE MODE

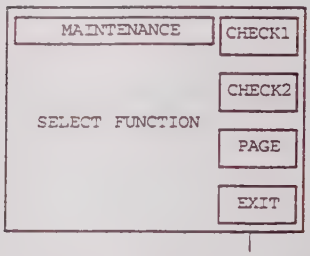
No.	Display Indicator	Correct Range	Warning Display	Printout
10	F1 (X–ray tube filament current)	95 – 160 (95 160 mA)	X–ray tube service life warning indicator (!!XT) will appear if value is from 90 to 95 or 160 to 165.	X–RAY TUBE error message will be output if F1 value is smaller than 90 or greater than 165.
11	XI (X–ray tube current)	250 – 350 (25 – 35 µA)		X–RAY CURRENT error message will be output if current falls out of the range at left.
12	TM (temperature)	5 – 45 (5 – 45°C)		SENSOR error message will be output if TM is less than –24 or greater than 75.
13	AT (atmospheric pressure)	613 – 1066 (613 – 1066 hPa)		SENSOR error message will be output if AT is less than 600 or TM is greater than 1071.

3. MAINTENANCE MODE

● Internal Condition Display (SLFA-20T only)

• Displaying the System Status-CHECK1

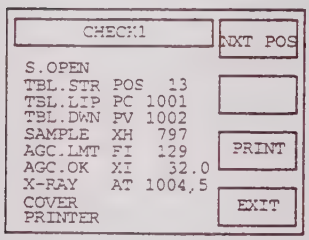
CAUTION This checking should be carried out if the Analyzer does not function properly. When it is hard to perform checking smoothly, contact to our service representative.



1 When the F3 key (PAGE), is pressed with the MAINTENANCE menu displayed, the MAINTENANCE menu will change as shown below.
Pressing the F3 key (PAGE), again will return the screen to the original MAINTENANCE menu.

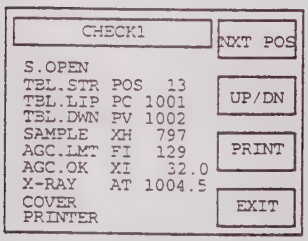
2 Pressing the F1 key (CHECK1), will display the CHECK1 menu and the system internal status.

Pressing the F4 key (EXIT), will return the screen to the READY menu.



3 Pressing the F1 key (NXTPOS), will once raise the turntable, shift it to the next POS#, and then put it down.
The chamber cover accordingly falls down. When the turntable is in the starting position, neither the turntable or the chamber cover will fall down. At the time, POS# will be 13 on the display.

Figures shown here are an example only.



4 Pressing the F2 key (UP/DN) when the turntable is at either position of POS#1 up to POS#12 will move the turntable at the chamber cover vertically.

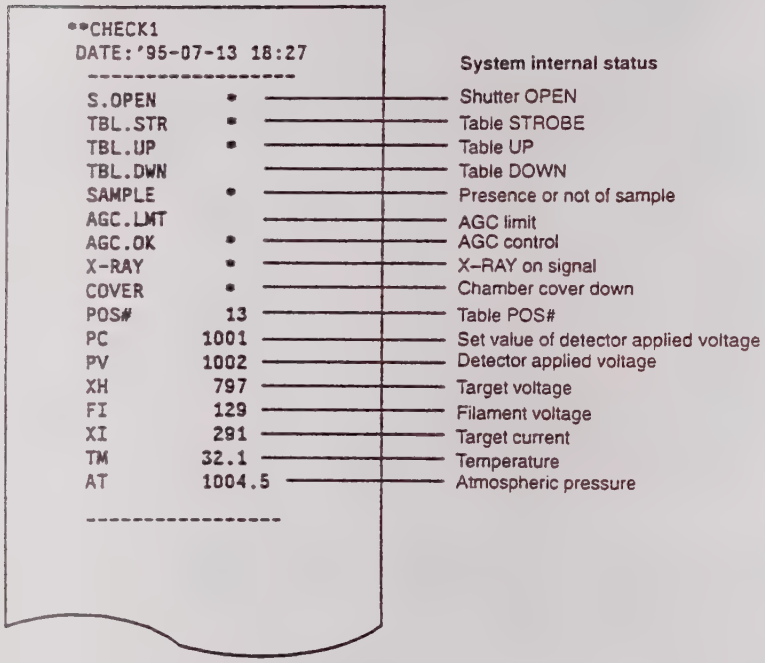
Note▸▸▸ The turntable and the chamber cover do not work when the sampler cover is open.

3. MAINTENANCE MODE

5 Pressing the F3 key (PRINT), will print out the System Internal status. This unit of condition is asterisked when print out.

Notes ►►►• Do not pull out the printer paper while printer is working.

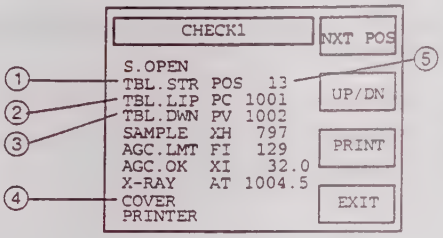
- After data is printed out, press the PAPER FEED button to feed the printer paper. Do not pull out the printer paper.



Figures shown here are an example only.

6 Pressing the F4 key (EXIT), will return to the READY menu.

3. MAINTENANCE MODE



The SLFA-20T will provide an internal condition display as shown above. Items ① through ⑤ are provided only by the SLFA-20T. The following explanation will cover only these. For information on the SLFA-20 model, see the appropriate section in the service manual.

No.	Display indicator	ON (when grayed out)	OFF (when not grayed out)
1	TBL STR (table strobe)	Turntable is indexed at start or at one of its 12 positions.	
2	TBL UP (table up)	Turntable and chamber cover are in their upper positions.	Turntable will not rotate if turntable and chamber cover are not in their upper positions.
3	TBL DWN (table down)	Shutter is open with turntable and chamber cover in their lower positions.	Analysis will not be executed if shutter is not open when turntable and chamber cover are in their lower positions.
4	COVER	The SAMPLER COVER DOWN lamp on the control panel will go ON when the sampler cover is closed. Turntable is allows to rotate in this condition.	The SAMPLER COVER DOWN lamp will not go on if the sampler cover is open. The turntable will not rotate in this condition.

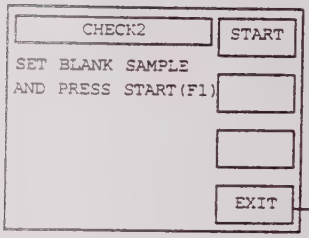
No.	Display	Display contents
5	POS X (X denotes one of the turntable's 13 indexed positions.)	Shows the current position of turntable from 1 through 12. 13 denotes the turntable's start position. The turntable position will be correctly displayed when the turntable strobe (TBL STR – see display no.1)) is on, but not when the turntable strobe is off.

3. MAINTENANCE MODE

Checking the AGC-CHECK2

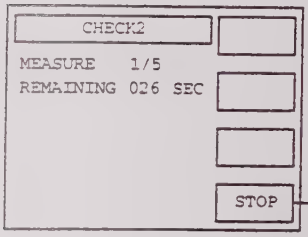
Note▸▸▸ Here is the explanation for the SLFA-20. For information regarding the SLFA-20T, refer to the instruction manual.

CAUTION This checking should be carried out if the Analyzer does not function properly. When it is hard to perform checking smoothly, contact to our service representative.



*Pressing the **EXIT** key, F4, will return to the READY menu.*

1 When the CHECK2 key, F2, is pressed with the MAINTENANCE menu displayed, the CHECK2 menu will appear as shown at left. Pressing the EXIT key, F4, will return to the READY menu.



2 Place a sample cell containing no sulfur on the sample stand and then press the START key, F1. Measurement will be carried out five times and the measurement count and the remaining time will be shown. For setting the sample cell, refer to the appropriate section.

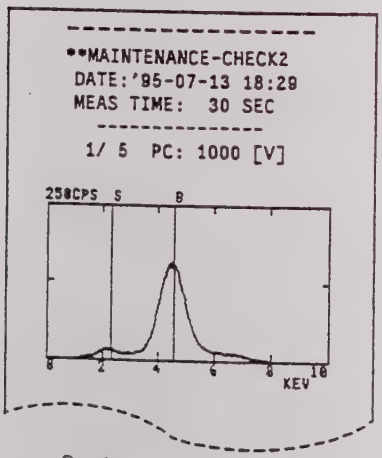
During the measurement, Pressing the **STOP** key, F4, will stop the measurement and return to the READY menu.

3 Upon completion of each measurement, a spectrum is printed out each time.

Notes ▸▸▸
- Do not pull out the printer paper while printer is working.
- After data is printed out, press the PAPER FEED button to feed the printer paper. Do not pull out the printer paper.

The vertical axis scale of the spectrum varies in accordance with the maximum value of the spectrum. In normal operation, this is 250 cps. When the maximum value exceeds 250, it becomes 500. If it exceeds 500, it becomes 1000.

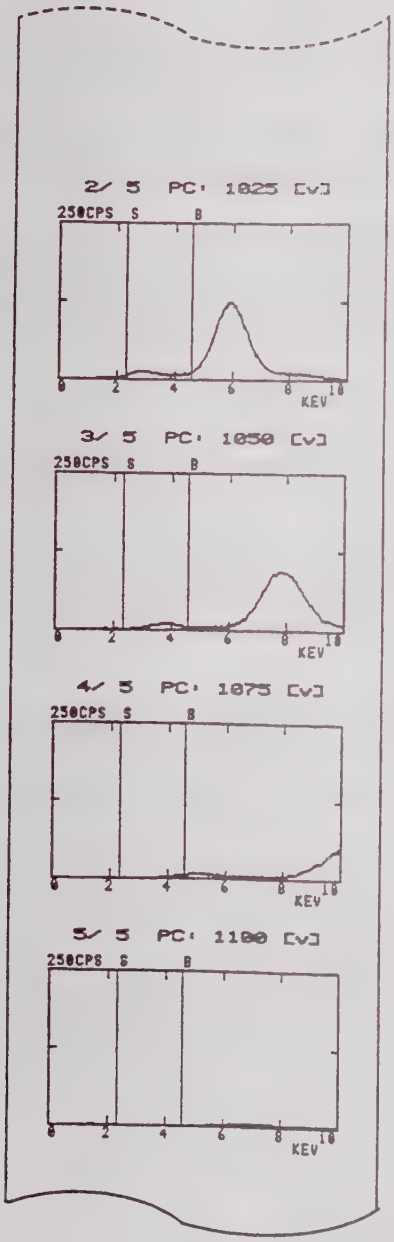
4 The screen will automatically return to the READY menu when this checking is completed.



Continued on next page.

3. MAINTENANCE MODE

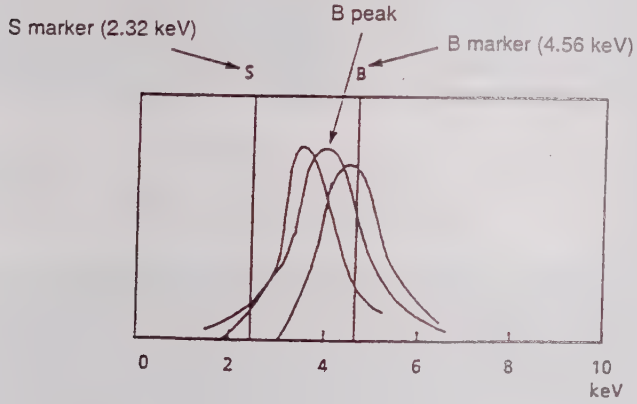
Continued



- CHECK AGC REFER TO THE CHECKING METHOD MENTIONED ABOVE

Change the supplying high voltage power supply (PC) of the detector to 1000, 1025, 1050, 1075, and 1100 V, perform a special measurement for 30 seconds and then print the results. In this measurement , use water as sample.
The measurement sample water does not contain sulfur, therefore only background (B) will appear on the spectrum. The B peak will move towards the right (high energy side) as the high voltage power voltage (PC) increases. AGC is possible if the center value of the B peak (the highest position) moves to the right of the B marker before 1100 V.

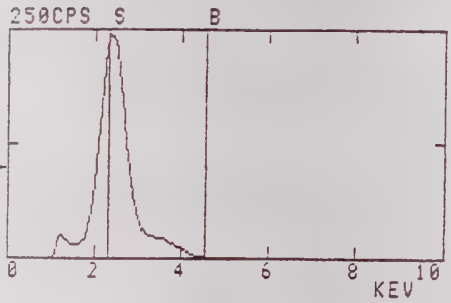
- If B peak does not pass the B marker at PC1100 V. the detector life has been reached.
- AGC can not be done when the center value of the B peak to the right (high energy side) of 5 keV when PC is 1000V. In this case. zero on the amplifier. faulty gain adjustment or faulty [SPR-03] can be considered



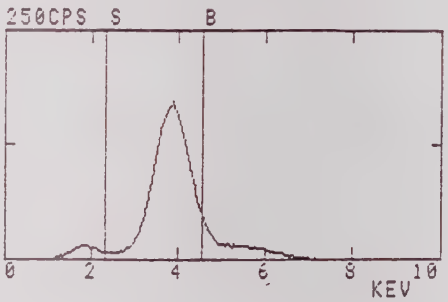
3. MAINTENANCE MODE

```
**MAINTENANCE-CHECK2
 DATE:'91-07-08 15:04
 MEAS TIME:  30 SEC
```

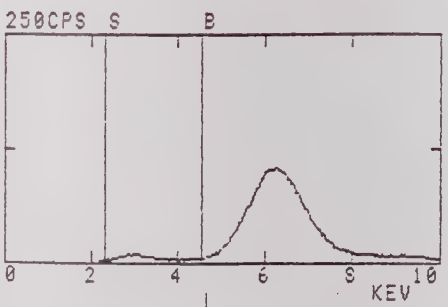
1/5 PC: 1000 [V]



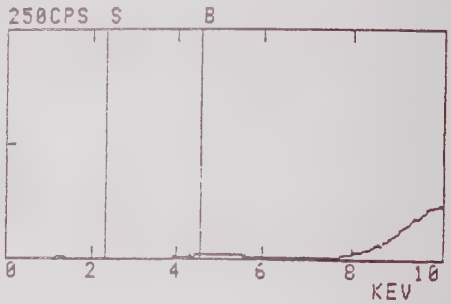
2/5 PC: 1025 [V]



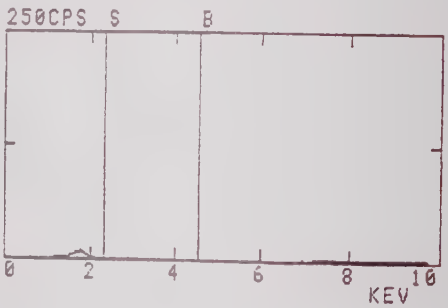
3/5 PC: 1050 [V]



4/5 PC: 1075 [V]



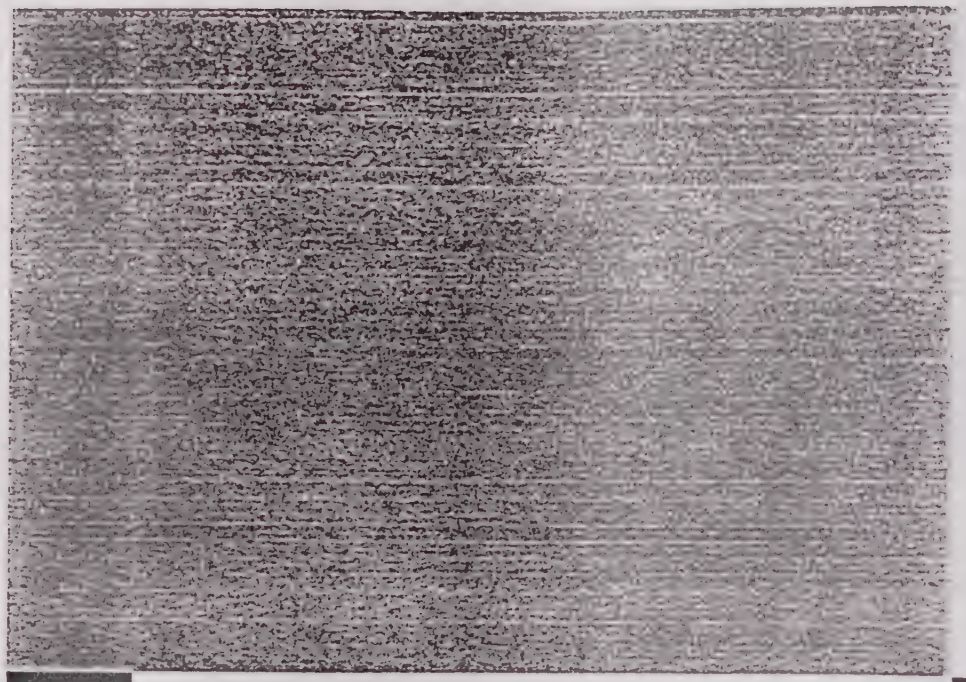
5/5 PC: 1100 [V]



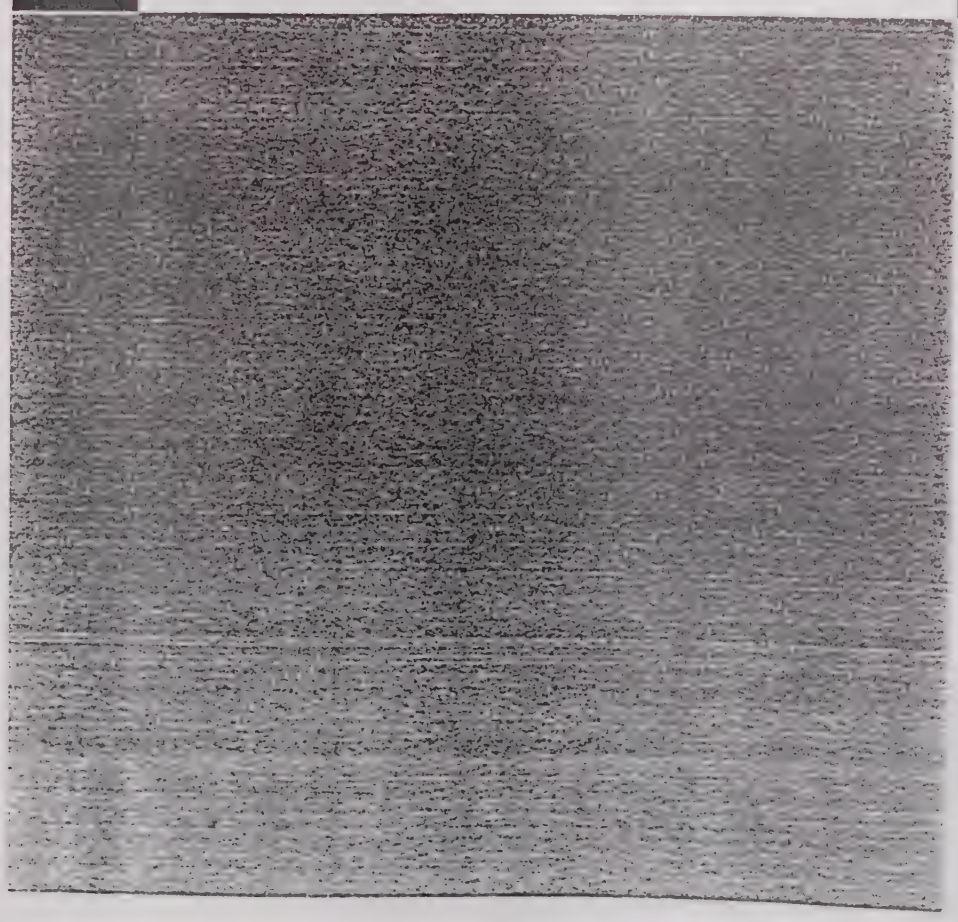
This example shows that B peak is over the B marker with PC1050 V.

This example shows that the B peak is on the lower energy side of 5 keV at PC1000.

CHAPTER 4
S. MAINTENANCE MODE



CHAPTER 4
S. MAINTENANCE MODE



4. S. MAINTENANCE MODE

The S.MAINTENANCE mode is only utilized when maintenance or adjustment work is being undertaken on the SLFA-20 or the SLFA-20T analyzer.

- **Selecting the S.MAINTENANCE mode:**

Execute the following procedures to call up the S.MAINTENANCE mode screen.

1 Turn power ON, and the LCD will assume a condition as shown in Fig.4-1.

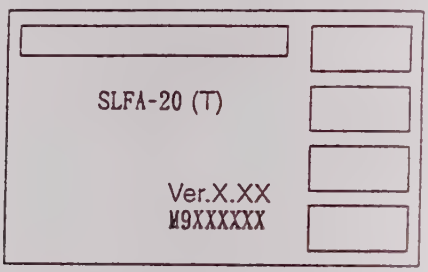


Fig.4-1 Opening Screen

2 Within 10 seconds of power ON, perform the following key operations.

[8] [1] [2] [1] [ENT]

3 The Maintenance Mode Selector screen will appear as shown in Fig.4-2. You can select the Maintenance Mode, Inspection Mode, or Internal Data Printout (INT DATA PRINT) mode as follows:

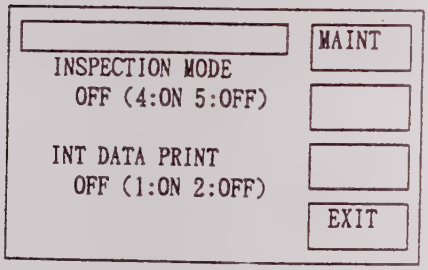


Fig.4-2 Maintenance Selector Screen

1) Maintenance Screen Mode

a. Press the F1 (MAINT) key from the Maintenance Selector screen (Fig.4-2).

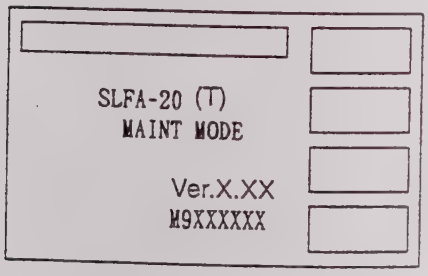


Fig.4-3 Maintenance Mode Standby Screen

4. S. MAINTENANCE MODE

b. The Maintenance Mode Standby screen (Fig.4–3) will appear for a few moments followed by the Maintenance Mode screen (Fig.4–4).

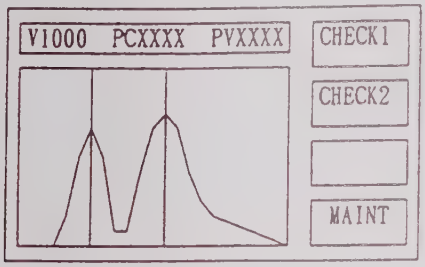


Fig.4–4 Maintenance Screen Mode

2) INT DATA PRINT mode

c. Press the 1 key from the Maintenance Selector screen (Fig.4–2) to activate the INT DATA PRINT function.

d. Press the F4 (EXIT) key.

e. In a few moments the X–ray generator will go ON and the READY screen will appear.

3) INSPECTION MODE

f. Press the [4] key with the maintenance selector screen displayed (figure 4.2). (This key operation is only effective for the SLFA–20T.)

g. Set the Inspection Mode to ON, and press the F4 (exit) key.

h. The turntable will start to rotate, X–rays will irradiate, and the READY (standby) screen will appear.

4. S. MAINTENANCE MODE

● Maintenance Screen Mode Functions

1 The X–ray spectrum will be written to the LCD screen every 10 seconds. The amp zero gain adjustment can be executed during this function. (See section 7 for more information on amp adjustments.)

2 The PC voltage (control voltage applied to the comparative analysis tube) and the PV voltage (monitor voltage applied to the comparative analysis tube) can be read on the screen. Accordingly, the PC and PV voltages can be adjusted through this screen. (See the section on SLFA–MCT–10 adjustment for more information.)

3 The V value (voltage command value applied to the comparative analysis tube) can be read on the screen. The V value will automatically be set to 1000 (1000VDC) when this screen is activated. Pressing the F2(CHECK 2) key will raise the V value to 1020 (1020VDC), and pressing the F1(CHECK 1) key will return the V value to 1000 (1000VDC). (See Checking AGC Function in section 12.)

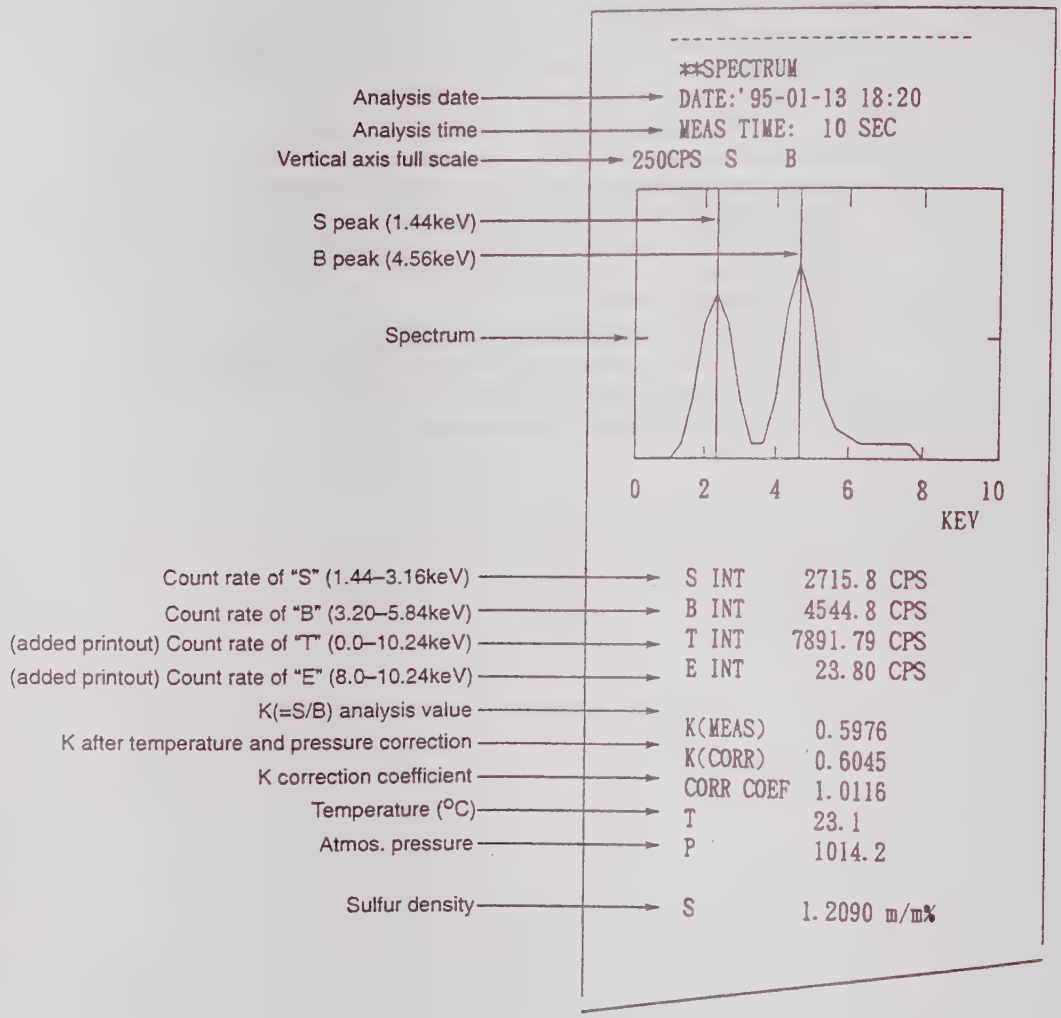
4 Pressing the F4(MAINT) key will put the unit into the AD converter refresh voltage adjustment mode used for monitoring voltage. (See the SLFA–MCT–01 adjustments section for more information.)

5 This mode will be canceled if power is turned off.

4. S. MAINTENANCE MODE

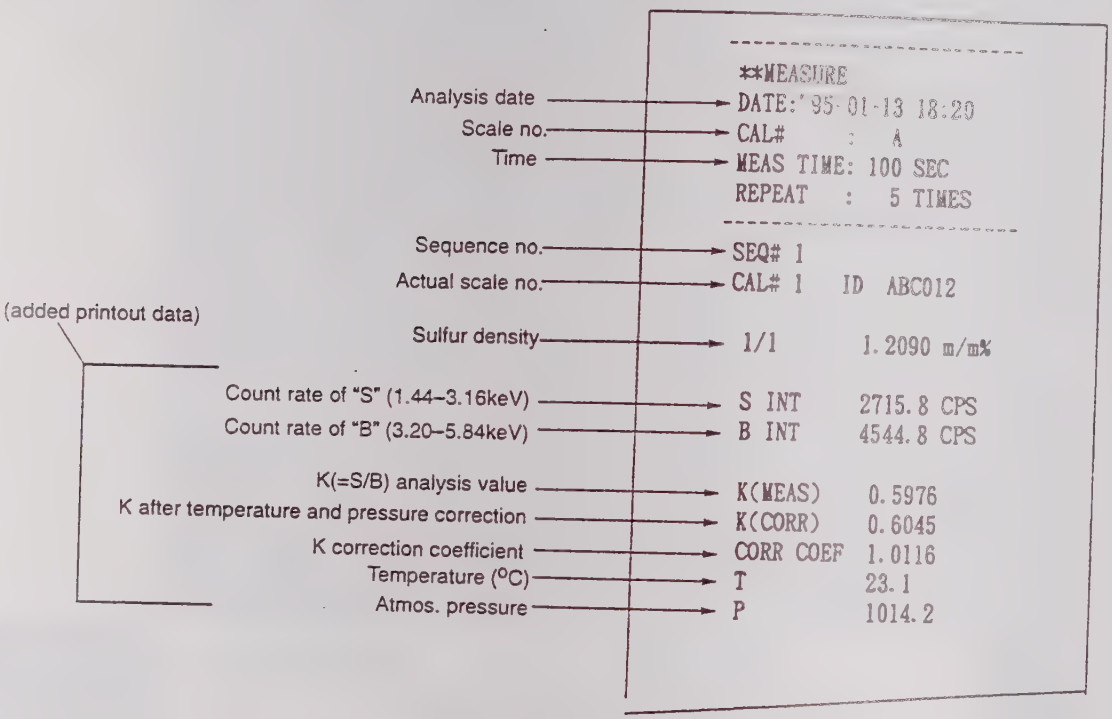
● INT DATA PRINT Mode Functions

1 Selecting this mode will add the T-INT and E-INT values in the printout when an analysis is run. (They are also included in the RS-232C output.) This function is used to conduct the spectrum check.



4. S. MAINTENANCE MODE

2 Selecting the INT PRINT DATA function will result in the following printout when an analysis cycle is run. (Data is also output in RS-232C format.) This function is used to analyze any abnormalities in the test results.



3 This mode will be canceled if power is turned off.

4. S. MAINTENANCE MODE

● INSPECTION MODE (SLFA–20T only)

1 This mode utilizes data which has been input into the unit before shipment. The following analysis cycles will be run automatically.

1. Analysis curves will be computed for the samples at positions 1 through 4.
2. A single analysis is run on the sample at position 5 for 600 seconds.
3. 10 analysis cycles are run on the sample at position 1 for 600 seconds each.
4. 10 analysis cycles are run on the sample at position 4 for 600 seconds each.
5. 50 analysis cycles are run on the sample at position 3 for 600 seconds each.

It takes approximately 13 hours for all of the analysis cycles to complete.

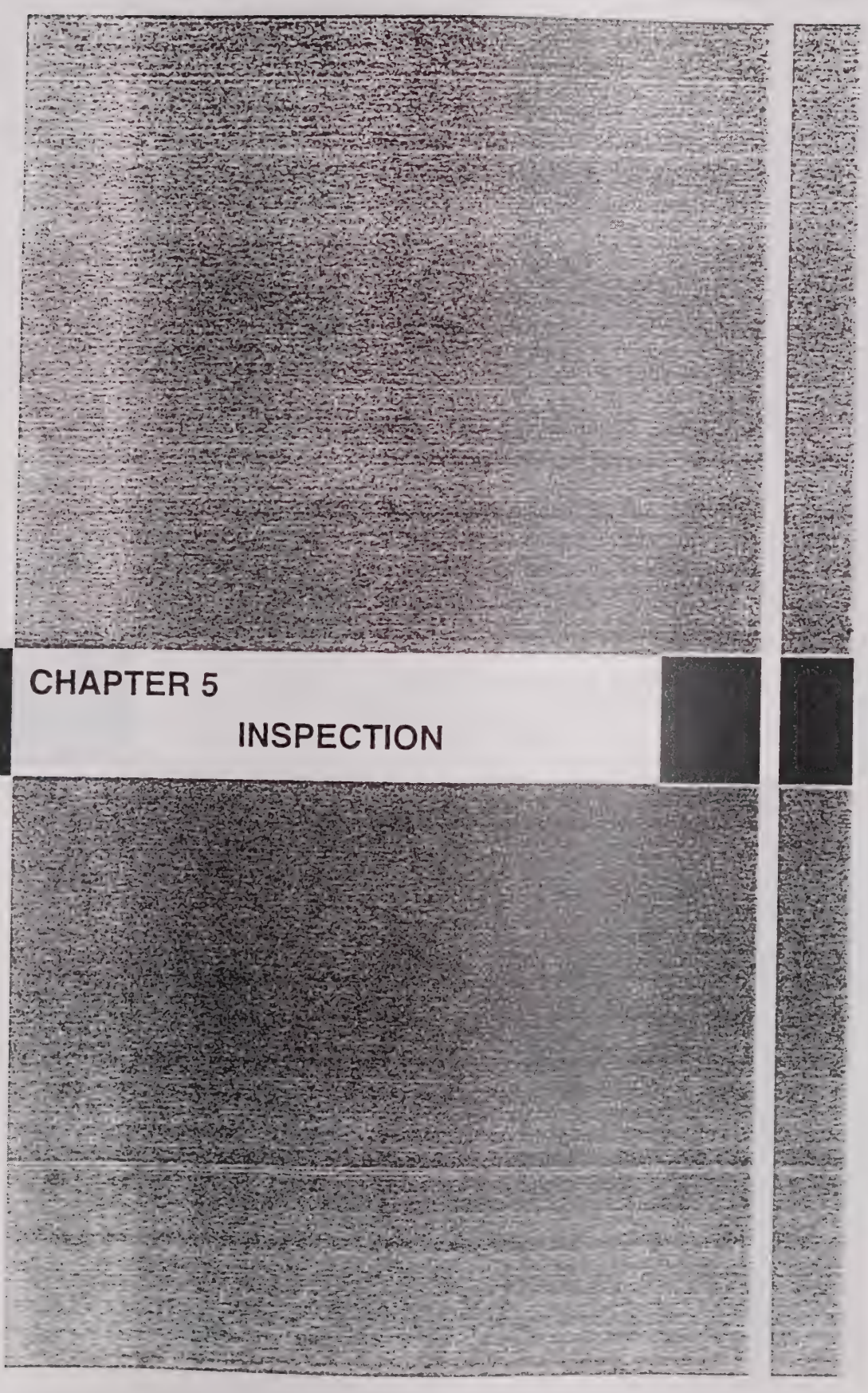
2 The following types of test samples were used at the factory to perform the analysis.

position 1	0.0 m/m%	These samples were used as a relative scale. Actual values will be calculated from the weight of the test samples utilized.
position 2	0.1 m/m%	
position 3	1.0 m/m%	
position 4	4.0 m/m%	
position 5	0.5 m/m%	

3 Procedure

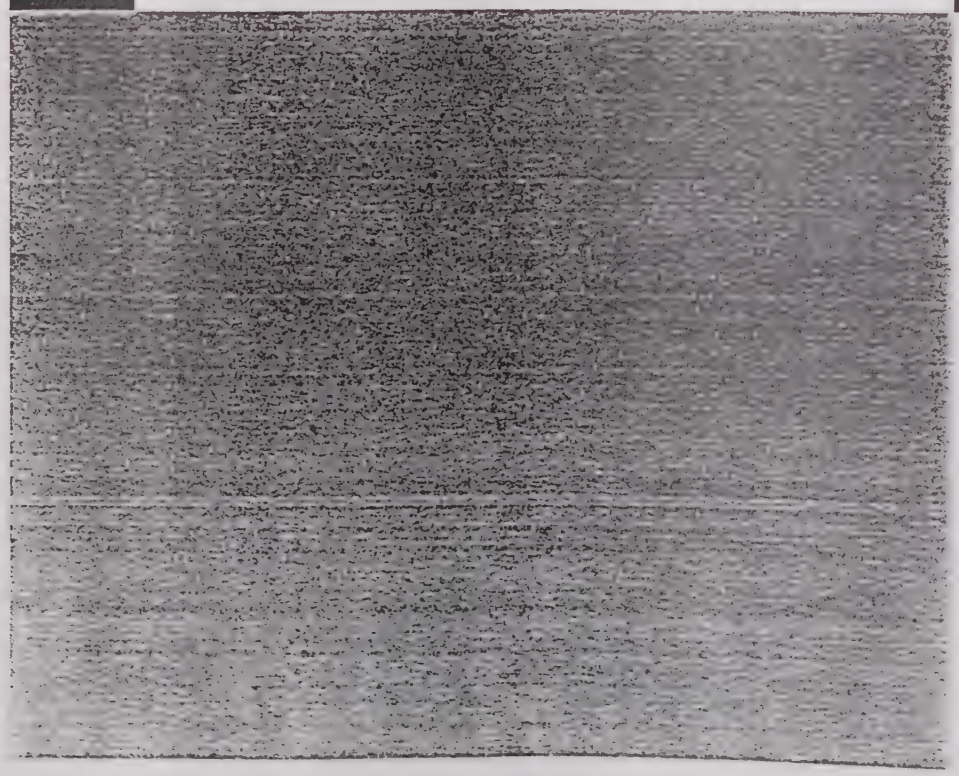
1. Call up the Inspection Mode.
2. Press the [MEAS] key.
3. Input conditions at the auto–correction screen.
4. Start auto–correction
5. Step 1 above will be executed automatically.

4 Turning the power off will cancel this mode.



CHAPTER 5
INSPECTION

CHAPTER 5
INSPECTION



5. INSPECTION

Performance Inspection

Preparation

1 Attach the instrument's cover and printer unit and turn the power on. (Aging of 30 minutes or more is necessary)

2 Prepare the preparation sample

- Prepare the preparation samples shown below. (Refer to the instruction manual for the preparation procedure.)

① 0 m/m% (wt%)	Qty. 1
② 0.1 m/m% (wt%)	Qty. 1
③ 0.5 m/m% (wt%)	Qty. 1
④ 1 m/m% (wt%)	Qty. 1
⑤ 4 m/m% (wt%)	Qty. 1

Notes ▸▸▸▸ The measured values for the preparation samples are different for different preparation sample lots.

- Verify that there is no leakage of the test sample from the test cell and that there are no cracks in the cell window. This verification should be done not only after the test preparation, but before all measurements.
- The effective limit for the test sample placed in the test cell is to be made the limit of this instrument's lot or within two weeks.

Working Curve

1 Turn the instrument on and allow aging for 30 minutes. Adjust the room temperature during the creation of the working curve to within ±5°C.

2 Creation of the Working Curve

- Create the working curve using one of each of the 0 m/m%, 0.1 m/m%, 1 m/m%, and 4 m/m% test samples. The conditions for creating the working curve are measuring each of the 4 types of preparation test samples listed below for 600 seconds. (For the procedure for creating the working curve, refer to the instruction manual.) There are no specific regulations for placing (or calibrating) the test samples.

3 Verifying the Working Curve

- Verify that the working curve created in the above step satisfies the conditions given below.

① 0 m/m% error (difference between calculated value and prepared value) ±0.0100 m/m% or less
② 0.1 m/m% error (difference between calculated value and prepared value) ±0.0100 m/m% or less
③ 1 m/m% error (difference between calculated value and prepared value) ±0.0200 m/m% or less
④ 4 m/m% error (difference between calculated value and prepared value) ±0.0500 m/m% or less

If these regulations are not satisfied, then it is judged that the working curve could not be accurately created. Confirm the test cell condition and once again create the working curve.

5. INSPECTION

● Verify the Repeatability and Graduation Accuracy

1 Turn the instrument on and allow aging for 30 minutes. Adjust the room temperature during measurement to within ±5°C.

2 Measurement conditions should be as below. (Refer to the instruction manual for setting the conditions and for the measurement procedures.)

① 0.5 m/m% test sample → 600 sec., 1 time measurement
② 0 m/m% test sample → 600 sec., 10 time measurement
③ 4 m/m% test sample → 600 sec., 10 time measurement
④ 1 m/m% test sample → 600 sec., 50 time measurement

Notes ►►►• For the test samples 2 through 4 for measurement above, you may use the test samples used for creating the working curve.

- Verify that there is no leakage of the test sample from the test cell and that there are no cracks in the cell window.
- There is no special regulation for the order of measurements for samples 1 through 4.

3 Verification of graduation accuracy: The results of the above measurements must satisfy the regulations given below.

- 0.5 m/m% measurement results for [conditions for *2*-①] → within ±0.0300 m/m% of graduation value
- 0 m/m% first time measurement result for [conditions for *2*-②] → within ±0.0100 m/m% of graduation value
- 1 m/m% first time measurement result for [conditions for *2*-④] → within ±0.0200 m/m% of graduation value
- 4 m/m% first time measurement result for [conditions for *2*-③] → within ±0.0500 m/m% of graduation value

4 Verification of repeatability: The results of the above measurements must satisfy the regulations given below.

- 0 m/m% the standard of deviation for [conditions for *2*-②] → within ±0.0015 m/m%
- 1 m/m% the standard of deviation for [conditions for *2*-④] → within ±0.0015 m/m%
- 4 m/m% the standard of deviation for [conditions for *2*-③] → within ±0.0060 m/m%

5. INSPECTION

Safety Inspection

Insulation Resistance

The insulation on the power supply cable between L, N, and E must satisfy the following: Measured insulation resistance = 100 MΩ or greater.

Note▸▸▸ As measured with the fuses installed and power turned on.

X-ray leakage test (1)

Survey meter to be used: GM counter (Aloka's TGS-121)
Measure the X-ray leakage from the instrument with the survey meter.

- **Locations of measurement**

In the case of the SLFA-20
Measurements shall be made at the following eight locations:
①Front side of the instrument (on the operation panel)
②Left side of the instrument
③Right side of the instrument (slit part)
④Back side of the instrument (back side of the printer unit)
⑤Upper side of the instrument (on the closed sample chamber cover)
⑥Sample chamber (open the chamber cover, remove the protective film, and press down the shutter to make a space for measurement)
⑦⑧Back side of the sample chamber cover (two locations in the clearance between the chamber cover and the rear cover)

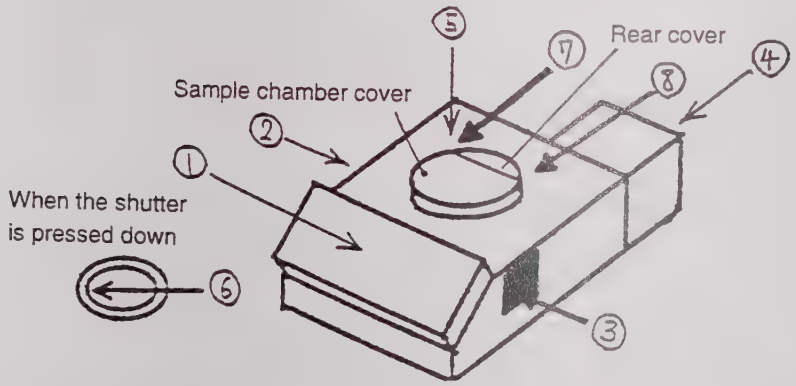


Fig.5-1 SLFA-20

5. INSPECTION

In the case of the SLFA-20T

Measurements shall be made at the following nine locations:

①Front side of the instrument (on the operation panel)
②Left side of the instrument
③Right side of the instrument (slit part)
④Back side of the instrument (back side of the printer unit)
⑤Upper side of the instrument (on the closed sample chamber cover)
⑥Sample chamber (open the chamber cover, remove the protective film, and press down the shutter to make a space for measurement)
⑦Back side of the sample chamber cover (close the cover)
⑧Right side of the sample chamber cover (close the cover)
⑨Left side of the sample chamber cover (close the cover)

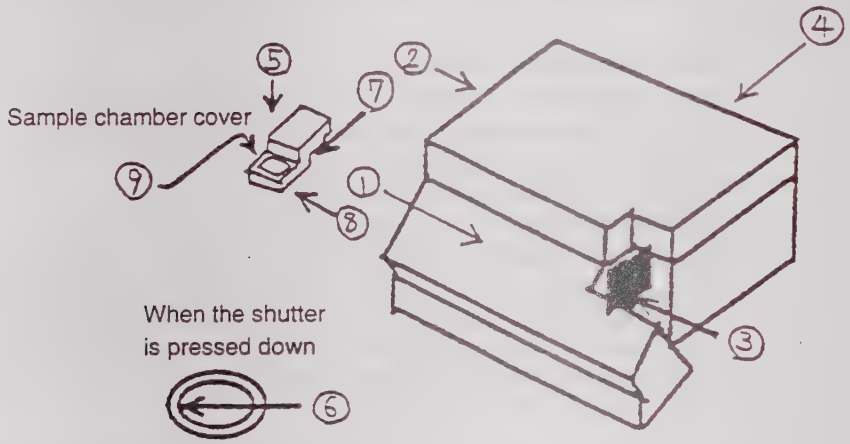


Fig.5-2 SLFA-20T

- Measurement method

  - Set the range of the survey meter (Aloka's TGS-121) to 10 CPS F.S.
  - Perform a background (B.G.) measurement (reading of the survey meter when the instrument is turned off).
  - Measure with the survey meter in contact with the measurement face. Hold it there until the survey meter reading stabilizes.

Note▸▸▸ During measurement, cosmic rays may enter and cause the reading of the survey meter to waver. If you can determine that the cause is cosmic rays, ignore this wavering and wait for a stable reading.

5. INSPECTION

- Standards

  – X–ray leakage = (Reading of the survey meter at each location) – (B.G.)
  – The X–ray leakage for all locations must satisfy the standard given below:

1.0 CPS or less

Note▸▸▸ The above standard cannot be applied to the products with the following manufacturing numbers:

SLFA–20: MFG Nos. 8904010101–8904010105
8904010201–8904010220
SLFA–20T: MFG Nos. 8905580101–8905580110

If the standard is satisfied. the following parts in the parts assemblage diagram should be replaced:

SLFA–20	S220012C01:	Nos. 3. 20. and 21 (one for each)
	S220013D01:	Nos. 15. 17. 42. 3. and 12 (one for each) and No. 40 (two)
SLFA–20T	S220012C01:	Nos. 3 and 21 (one for each)
	S220013D01:	Nos. 42. 3. and 12 (one for each)
	S220046D01:	Nos. 1. 91. 95. 50. and 33 (one for each)
	S220050B01:	No. 1 (one)

● X–ray leakage test (2)

Survey meter to be used: VICTOREEN's 440RF

Measure the X–ray leakage from the instrument with the survey meter.

1 Measurements shall be made at the following six locations:

①Front side of the instrument (on the operation panel)
②Left side of the instrument
③Right side of the instrument
④Back side of the instrument (back side of the printer unit)
⑤Upper side of the instrument (on the closed sample chamber cover)
⑥Sample chamber (open the chamber cover, and remove the protective film)

2 Measurement method

- Set the range of the survey meter (VICTOREEN's 440RF) to 10 micro Sv (1 mR) F.S.
- Perform a background (B.G.) measurement (Reading of the survey meter when the instrument is turned off).
- Measure with the survey meter in contact with the measurement face. Hold it there until the survey meter reading stabilizes.

Note▸▸▸ Structurally. the survey meter cannot be held in contact with the sample chamber ⑥. Locate the meter as close as possible to the chamber.

Note▸▸▸ During measurement. cosmic rays may enter and cause the reading of the survey meter to waver. If you can determine that the cause is cosmic rays. ignore this wavering and wait for a stable reading.

3 Standards

- X–ray leakage = (reading of the survey meter at each location) – (B.G.)
- The X–ray leakage for all locations must satisfy the standard given below:

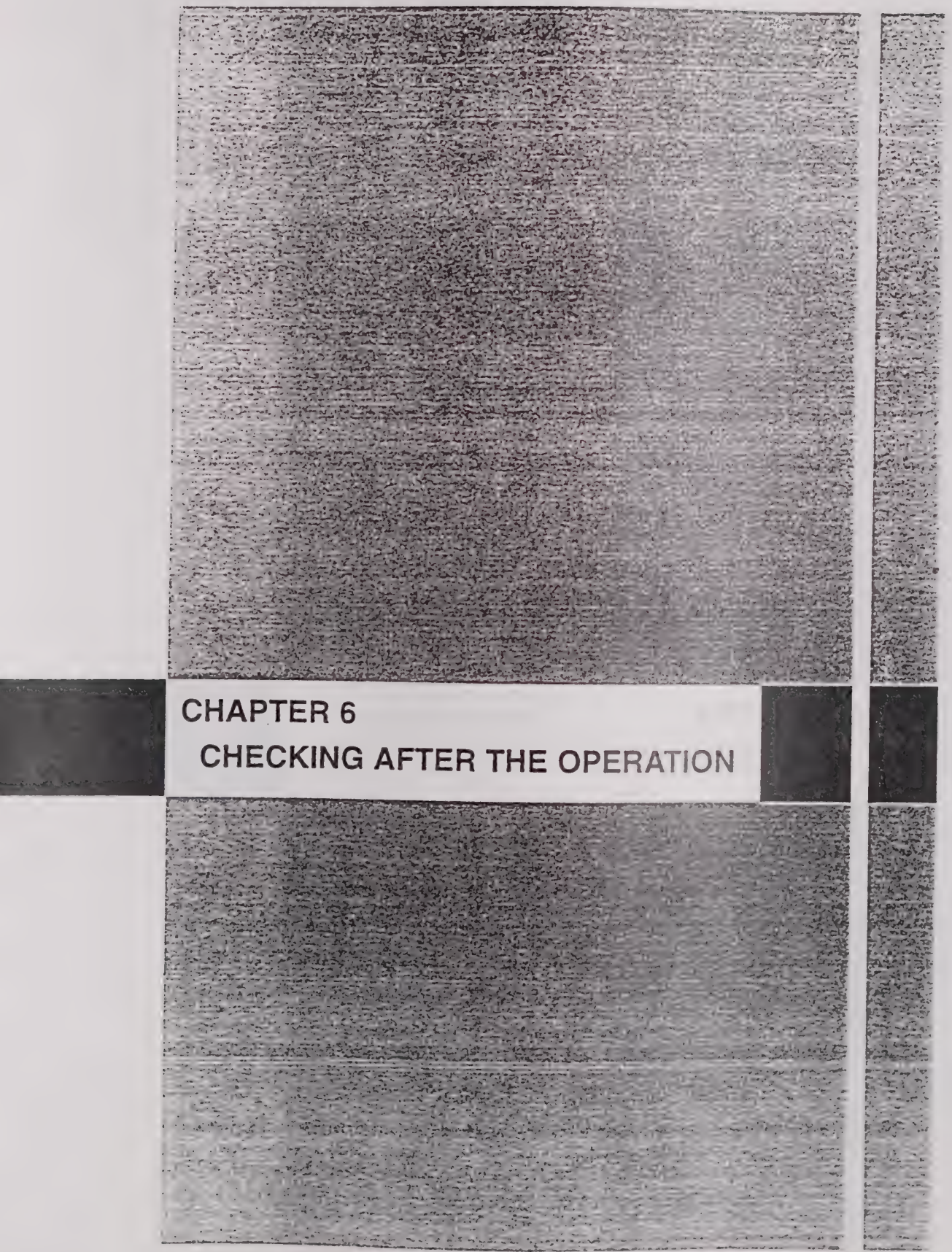
1 μ Sv/h (0.1 mR/h) or less

5. INSPECTION

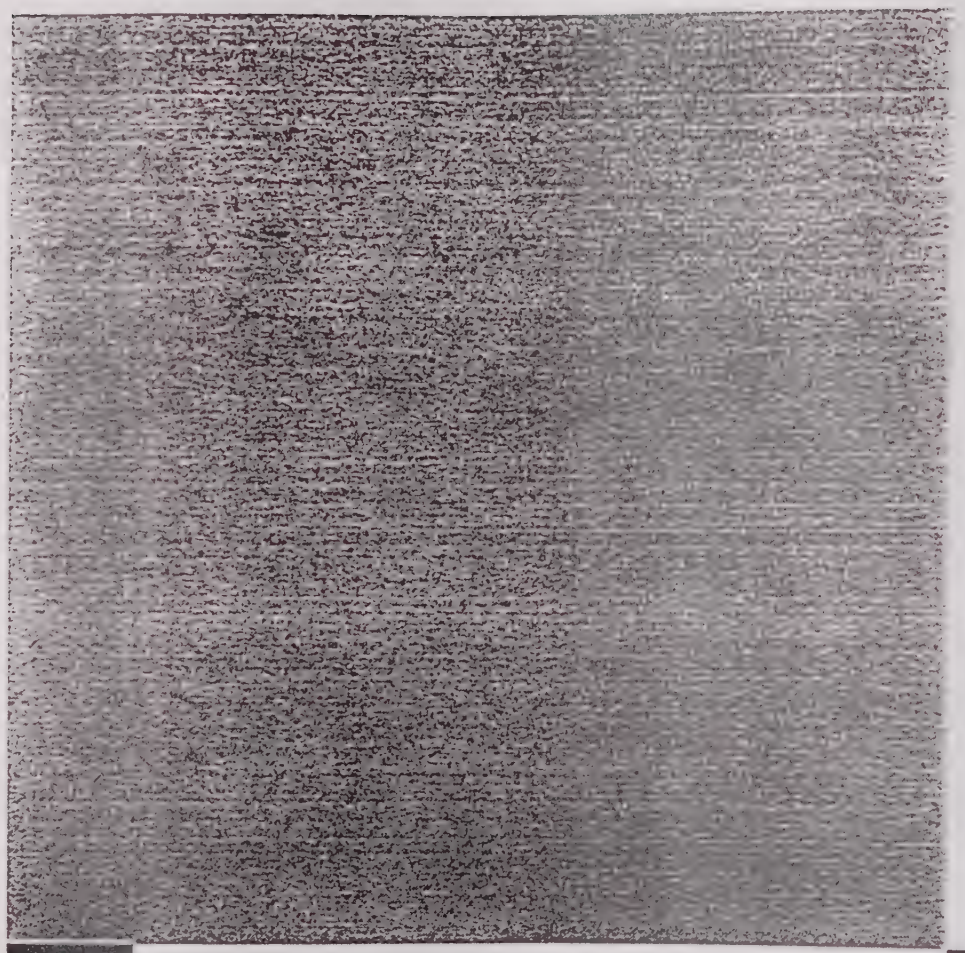
● Interlock Verification

Verify the following regarding the interlock.

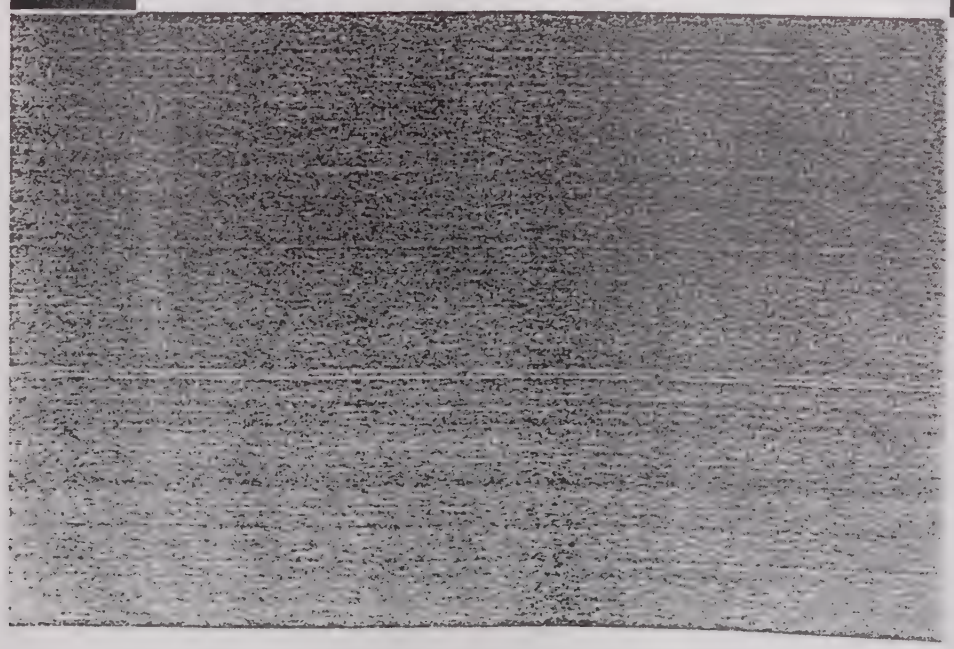
- When the sample chamber is closed, verify that the cover lock is locked (the tab is properly inserted into the groove in the cover).
- When the sample chamber is opened, verify that the shutter is closed (remove the protective film unit).
- When the sample chamber is opened, verify that the shutter lever is locked.
- When the X-RAYS ON lamp is removed, verify that the X-rays are turned off (the [XH] of the [CHECK1] screen is less than 5).



CHAPTER 6
CHECKING AFTER THE OPERATION



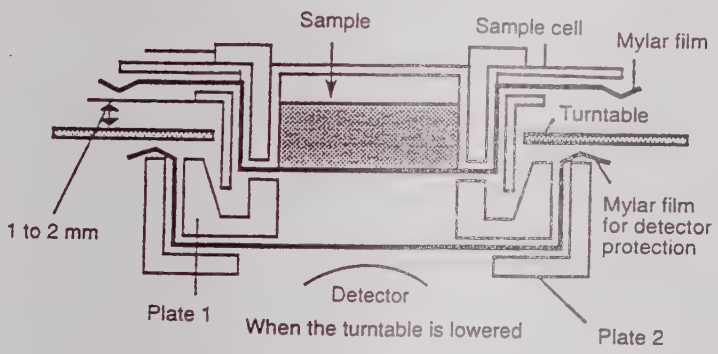
CHAPTER 6
CHECKING AFTER THE OPERATION



6. CHECKING AFTER THE OPERATION

This chapter explains the instrument functions and external checks to be performed after a malfunction.

● Function

Item	Procedure
• Protective Film • Turn Table (SLFA–20T Only)	• Refer to instruction manual • Verify that the sample is set in the measuring position, • Verify that it is resting on the center of the protective unit. • Verify that there is a 1 to 2 mm gap between the cell outer frame and the turntable. • Verify all samples from No. 1 to 12. SLFA–20T 
• Sample Chamber Door	• Verify that it opens and closes smoothly
• Working Curve	**Ref.▸▸▸** Instruction manual
• Calendar/Timer	**Ref.▸▸▸** Instruction manual
• Recording Paper	**Ref.▸▸▸** Instruction manual
• Spectral verification	**Ref.▸▸▸** CHAPTER 3
• Check 1	**Ref.▸▸▸** CHAPTER 3

6. CHECKING AFTER THE OPERATION

● Environment

Item	Procedure
• Temperature and humidity	• Verify that the temperature is between 5°C and 40°C. • Verify that the humidity is below 85%RH if below 30°C or below 50%RH if below 40°C.
• Environment	• Verify that no water is sprayed • Verify that there are no corrosive gases • Verify that there is not excessive dust • Verify that the measurement gas does not exist • Verify that there is adequate ventilation
• Dangerousness	• Verify that no gas tanks or organic solvents are placed nearby in dangerous situations. • Verify that no open flames present
• Storage conditions	• Verify that the instrument will not be subject to UV rays for long periods of time
• Vibration	• Verify that there is not excessive vibrations
• Noise	• Verify that there is no generator of electrical noise nearby

● External appearance

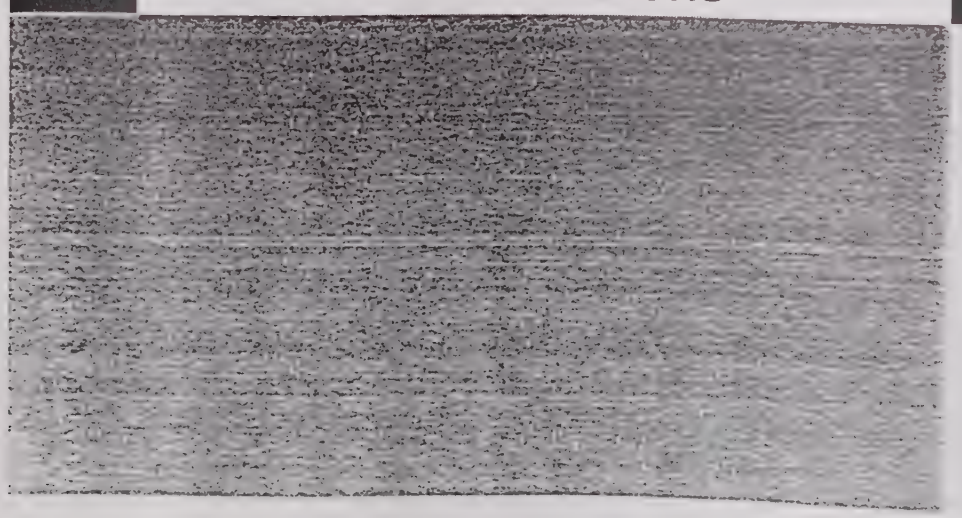
Item	Procedure
• External appearance of instrument	• Verify cleanliness and if dirty, wipe with soft, dry cloth
• Condition of installation	• Verify that the installation screws, pipes, and wiring are not loose.

CHAPTER 7

SLFA-20 ADJUSTMENTS & VERIFICATIONS

CHAPTER 7

SLFA–20 ADJUSTMENTS & VERIFICATIONS



7. SLFA–20 ADJUSTMENTS & VERIFICATIONS

1. PREPARATIONS

1-1. Unit Status Before Adjustment

The unit can be adjusted in either an "A" or "B" adjustment status as listed below. The explanations in this manual will usually state if the procedure is being undertaken with the unit in the "A" or "B" adjustment status.

- **A ADJUSTMENT STATUS: With cover removed.**

1 Turn power off.
2 Remove lever grip.
3 Disconnect printer.
4 Remove cover.
5 Connect printer with extension cable.
6 Pull out the two cover switch actuators to activate the switch..

- **B ADJUSTMENT STATUS: With power unit attached to the chassis and shutter base open.**

1 Turn power off.
2 Remove lever grip.
3 Disconnect printer.
4 Remove cover.
5 Connect printer with extension cable (E013047600).
6 Push in the two cover switch actuators to deactivate the switch (release the pull–lock–on function).
7 Remove the wiring holder (a metal plate on the right side of the instrument).

Ver. 2 Ver. 3 Ver. 4

8 Remove the shutter base screws.
9 Open the shutter base and install the shutter base support (H381436–01).

Note▸▸▸ Adjustment operations in the A and B adjustment statuses are differentiated as follows:

Operations carried out with the unit in the A adjustment status are 2 through 8.
Operations carried out with the unit in the B adjustment status are 9 through 15.

1. Preparation
2. Test Chamber Door Adjustment
3. Power Unit Adjustment
4. SLFA–MCT–01 Adjustment
5. High Voltage Power Supply
6. Initializing the CPU
7. Amp Adjustment
8. Closing the Shutter Base
9. Verifying CHECK 1 Mode Functions
10. Spectrum Adjustment & Check
11. CHECK 2 Mode Functions
12. AGC Function Check
13. RS Output Check
14. Interlock Check
15. Miscellaneous Functions
16. Cover Attachment

7. SLFA–20 ADJUSTMENTS & VERIFICATIONS

1-2. Tools & Measuring Instruments

The following tools and measuring instruments will be needed to adjust the unit.

1-2-a. Tools

1 Printer extension cable (E013047600)

2 Base supporter (H381436–01)

3 Cam adjustment board

H585330–01 (t=2.3) : Ver. 1 Ver. 2

H592579–01 (t=1.2) : Ver. 3

4 Three test cells

- Tap water test cell
- Heavy oil test cell (F021218100) for heavy oil reference test (sulfur density of approx. 1m/m% by weight)
- Empty test cell

1-2-b. Measuring Instruments

1 4–digit 1/2 digital volt meter

Note▸▸▸ AC measurements should be conducted with a meter capable of true RMS readouts. These types of meters include the Fluke Type 87 True RMS Voltmeter and the Hioki Type 3230 Digital Hi Tester. For AC measurements with more than 4–digit 1/2 display, use meters capable of True RMS measurement.

2 Analog oscilloscope capable of reading over 200MHz.

3 Current probe (Kenwood PC–80) (E013277500 and E011042700) or (SONY Tektronix A622) (E013332600)

4 RS–232C compatible printer and cable (Seiko DPU–411, for example)

5 Thermometer (SLFA–1XXX checker or similar)

6 Barometer (SLFA–1XXX checker or similar)

2. TEST CHAMBER COVER ADJUSTMENT

2-1. Adjusting the test chamber cover

1 Pulling the lever will open the test chamber cover as a result of spring pressure

Ref.▸▸▸ Fig.7-2-1

2 If the cover does not open, perform the following two adjustments.

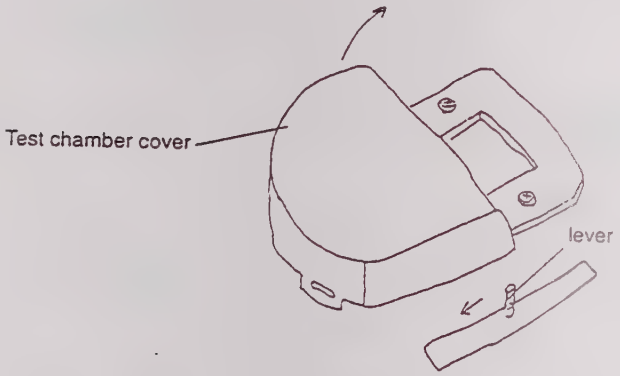


Fig.7-2-1

- Loosen the door stay screws and slide the cover toward the rear.

Ref.▸▸▸ Fig.7-2-2

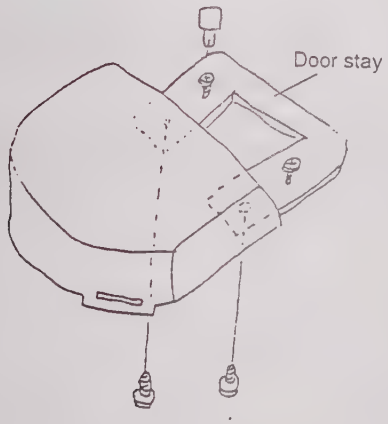


Fig.7-2-2

- Loosen the cam screws. and slide the cam toward the rear.

Ref.▸▸▸ Fig.7-2-3

7. SLFA–20 ADJUSTMENTS & VERIFICATIONS

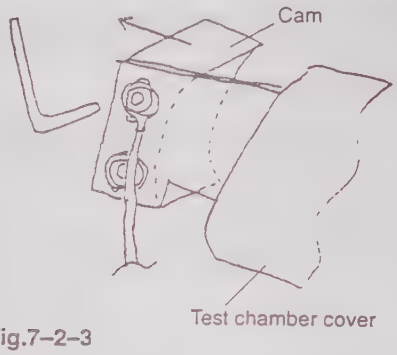


Fig.7–2–3

Note▸▸▸ Be sure not to adjust the sample chamber cover too far toward the back side; the chamber cover should not come into contact with the film holder cover.

Ver. 3

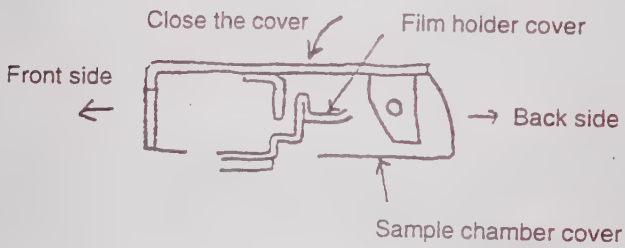
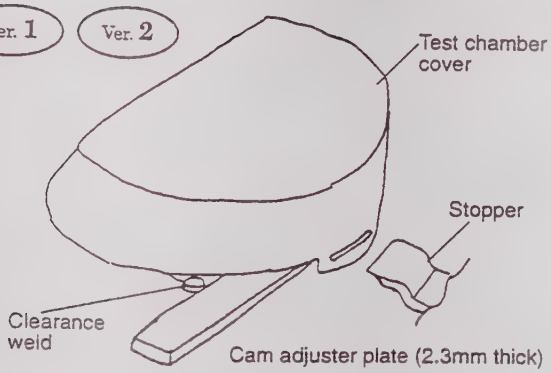


Fig.7–2–4

3 With the shutter open, insert a cam adjuster plate over the shutter base weld (see Fig.7–2–5). Close the sample chamber cover, and pinch the cam adjuster plate.

Ver. 1 Ver. 2



Ver. 3

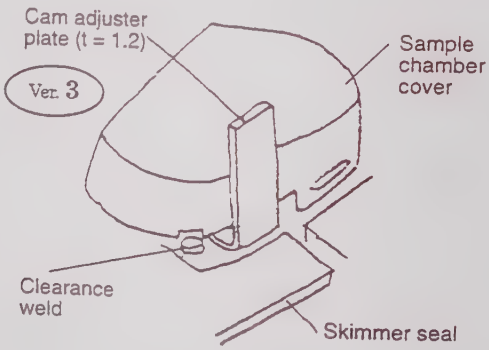


Fig.7–2–5

4 Adjust the cam position in the vertical direction so there is light contact between the cam and shutter (**Ref.▸▸▸** Fig.7–2–7).

Note▸▸▸ The point of light contact is where the spring is able to pull the lever to its farthest forward position. Even it the cover closes slowly, the stopper finger should insert into the cover slot.

7. SLFA–20 ADJUSTMENTS & VERIFICATIONS

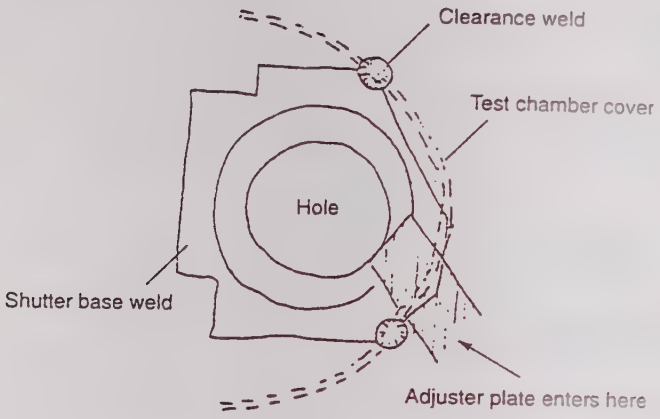


Fig.7–2–6 top view

5 After adjusting the cam as explained in step 4 above, repeat steps 1 through 3 as necessary if the test chamber cover open–close mechanism is loose.

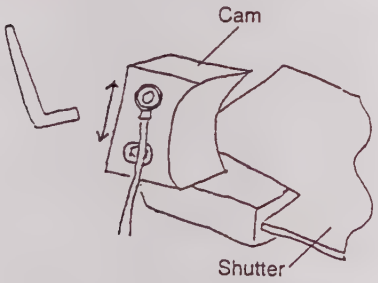


Fig.7–2–7

6 When the test chamber cover closes, verify that spring pressure has pulled the cover to its rearmost position. Also check that the stopper finger is inserted into the cover slot to lock the cover in position. If the cover does not close correctly, repeat adjustment steps 1 through 4 as necessary.

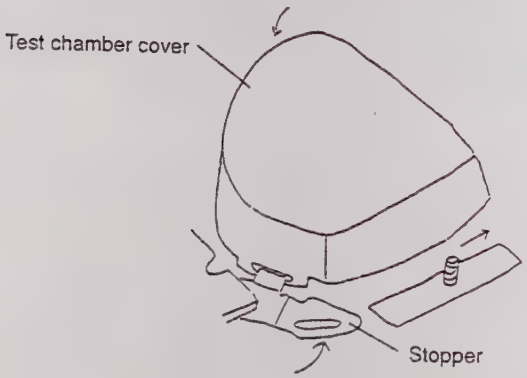


Fig.7–2–8

7. SLFA-20 ADJUSTMENTS & VERIFICATIONS

2-2. Verifying shutter movement

1 When the test chamber door opens, verify that the shutter is completely closed (**Ref.▸▸▸ Fig.7-2-10**). (Ver. 1) (Ver. 2)

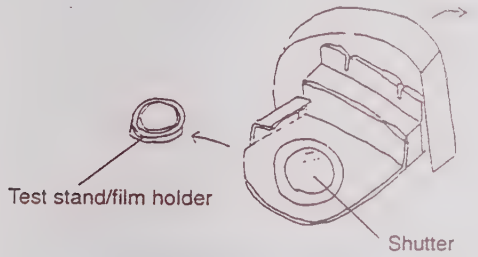


Fig.7-2-9

(Ver. 3)

Open the sample chamber cover and confirm that the mark-off line of the shutter is invisible from the base window (**Ref.▸▸▸ Fig.7-2-10**).

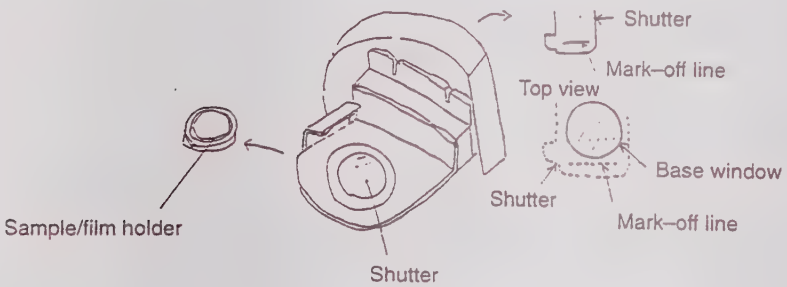


Fig.7-2-10

2 When the test chamber cover closes, verify that the shutter is open. As shown in **Fig.7-2-11**, verify an open shutter condition by checking that the shutter base is open (unit in B adjustment status) and that the shutter and shutter open sensor are correctly positioned.

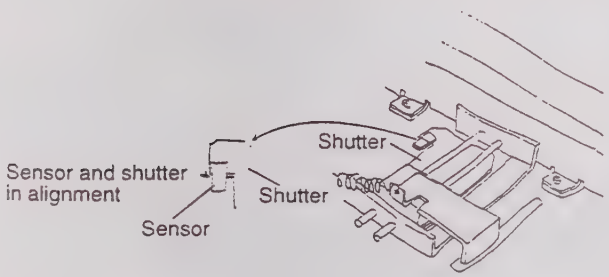


Fig.7-2-11

3. POWER UNIT ADJUSTMENT

3-1. Preparation

1 The power unit adjustment is conducted with the shutter base open in the B adjustment status and with the power unit installed in the chassis.

2 Remove the power unit cover.

3 Remove PCB board [SLFA-XHV-02].

4 Check that a 1 amp timed fuse is in the power module. (There should also be an extra fuse installed.)

5 Insert the power cable at the inlet and measure the insulation resistance. There should be at least 100MΩ for 1,000VDC.

Note▸▸▸ The insulation check should be done with power ON, and power should be turned OFF after the check is completed.

Table 7-1 Power voltages

Terminals	Check values	Adjustment
CN5 1 – 2	DC5.2V ± 0.05V (DC5.15V – 5.25V)	VRI
CN6 1 – 2	DC15V ± 0.75V (DC14.25V – 15.75V)	verify
CN5 3 – 2	DC5.2V ± 0.05V (DC14.25V – 15.75V)	verify

Note▸▸▸ Power unit chassis may also be used as the second pin.

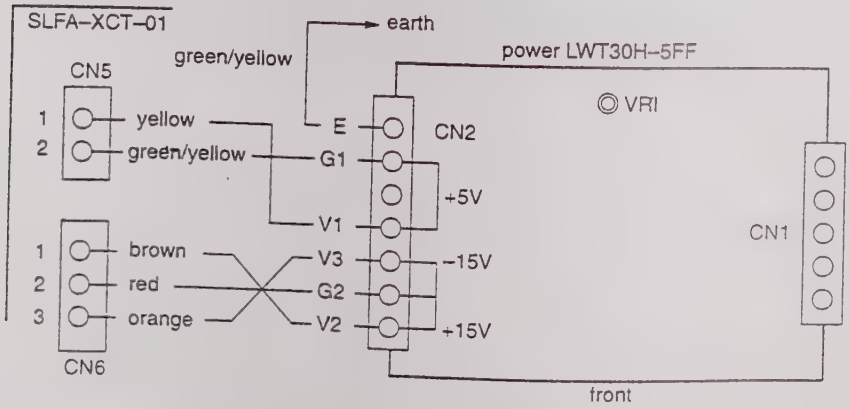
3-2. Power Adjustment

1 Turn power ON (AC100V).

2 Check for power at the SLFA-MCT-01 connector on the PCB board. Adjustment is necessary if the reading is more than 5 volts higher than specified in **Table 7-1.**

3 Verify that the two fans (rear panel and X-ray tube) are on.

Fig.7-3-1 Power verification terminals



3-3. After adjustment and verification:

1 Place paper in the printer.

2 After turning power off, install the power supply cover.

7. SLFA-20 ADJUSTMENTS & VERIFICATIONS

4. SLFA-MCT-01 BOARD ADJUSTMENT

4-1. Preparation

1 This adjustment is down with the power unit installed in the chassis and the unit in B adjustment status. Push in the two cover switch actuators to release the switch from its locked-on condition.

2 Remove the SLFA-XHV-02 PCB circuit board.

3 Turn on power and the LCDs will light as shown in **Fig.7-4-1**.

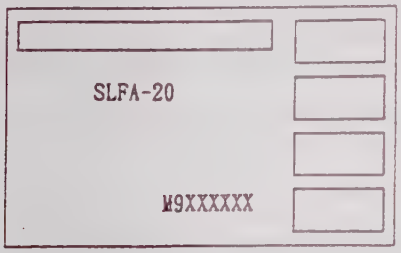


Fig.7-4-1 Opening Screen

4 Within 10 seconds of power on, slowly press the numerical keys in the order shown below.

8	1	2	1	ENT

5 Press the F1 (MAINT) key as shown in Fig.7-4-2.

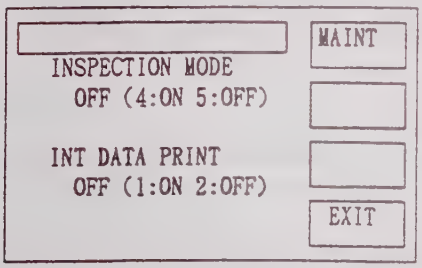


Fig.7-4-2 Maintenance Selector Screen

6 The screen shown in **Fig.7-4-3** will appear, and then an error message will appear within 30 to 60 seconds. Press the F4 key several times until you get the display shown in **Fig.7-4-4**.

4-2. Adjustment

1 Press the F4(MAINT) key and the screen display will change from V1000 to V2000.

2 Adjust VR4[VREF] on the SLFA-MCT-01 PCB circuit board to get a reading of DC10.000V ± 0.010V between TP9[MENT] and TP7[AGND] on the board. Refer to Fig.7-4-5 for the location of TP and VR on the SLFA-MCT-01 board.

3 Press the F1(CHECK) key and the display will change from V2000 to V1000.

4 Adjust VR1[ZSHV] on the SLFA-MCT-01 board so the reading at PC and PV is 1000±1.

5 After the adjustment is completed, turn power off.

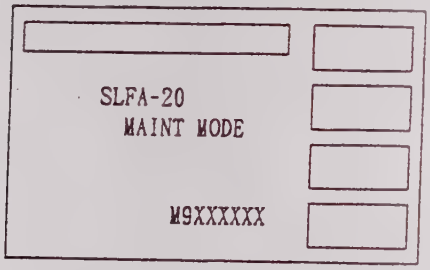


Fig.7-4-3 Maintenance Mode Standby Screen

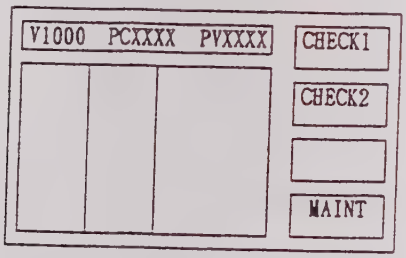


Fig.7-4-4 Maintenance Mode Screen

7. SLFA-20 ADJUSTMENTS & VERIFICATIONS

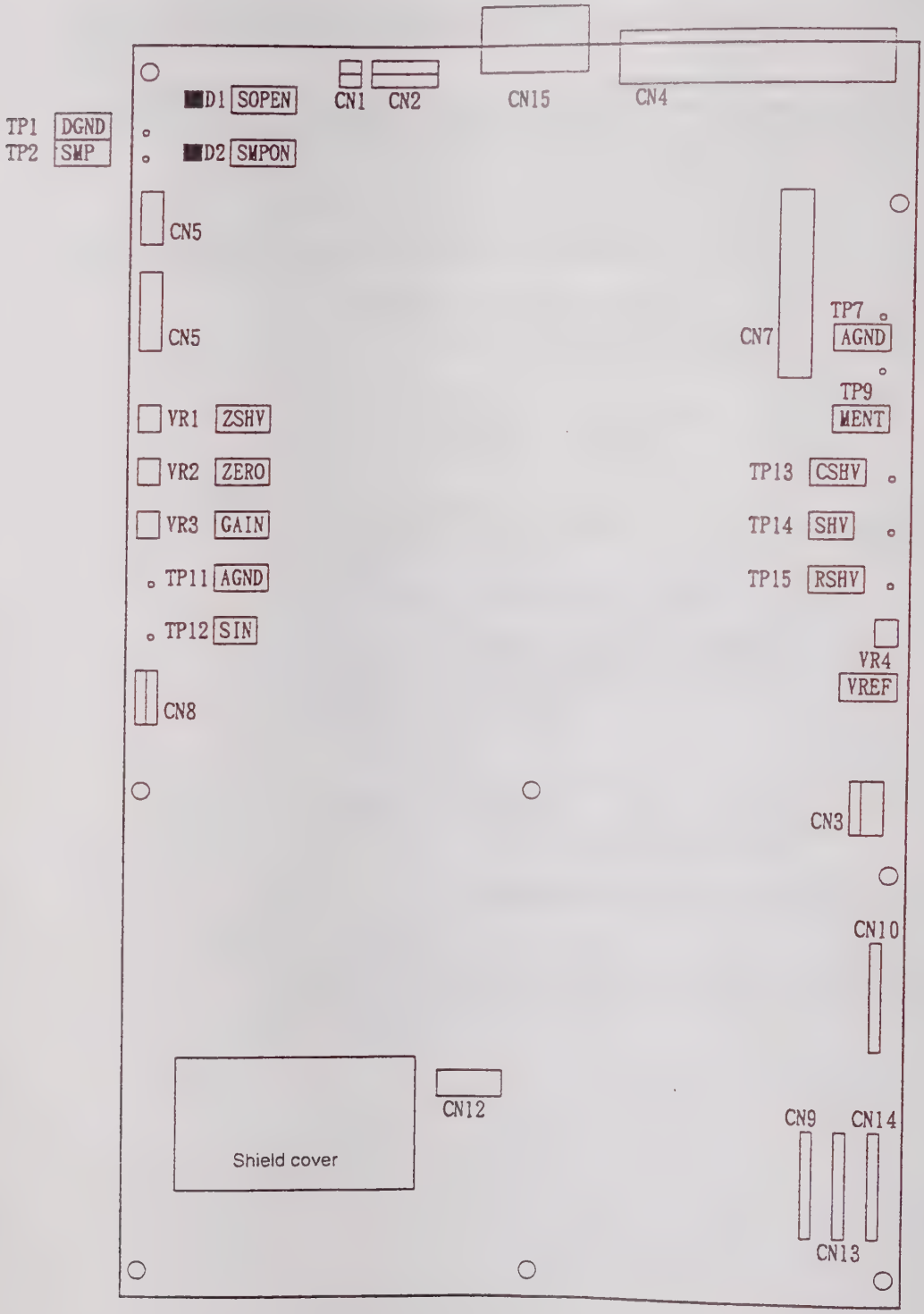


Fig.7-4-5 SLFA-MCT-01 circuit board

5. HIGH VOLTAGE POWER SUPPLY

5-1. Verifying PC voltage

5-1-a. Preparation

1 With the power unit installed in the chassis and the shutter base open in the B adjustment status, push in the two cover switch actuators to release lock.

2 Remove terminals CN1, CN2, and CN5 from the SLFA-XHV-02 board and install the board (**Ref.▸▸▸Fig.7-5-1**).

3 Measure the voltage between the CN5 1 and 3 pins on the SLFA-XHV-02 board. USE EXTREME CAUTION BECAUSE THIS IS A HIGH VOLTAGE MEASUREMENT.

Note▸▸▸ The 3 pin is a ground. The digital meter range should be set at DC1000V. Be sure to use high voltage cables for this measurement.

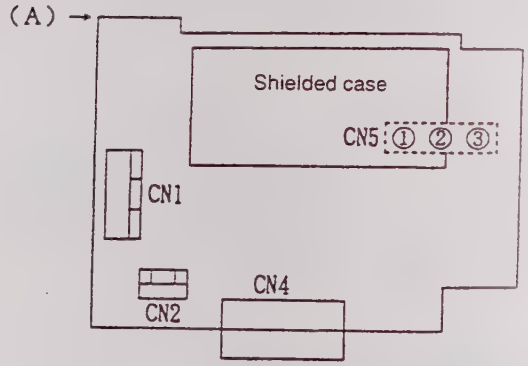


Fig.7-5-1 SLFA-XHV-02 circuit board

5-1-b. Verification

1 If you are continuing from the SLFA-MCT-01 adjustment (section 4), go directly to step 4 below after power on.

2 Verification can be executed from the maintenance screen as described previously in items 3 through 6 of section 4-1.

3 Press the F1[CHECK] key.

4 Output voltage should be 1000VDC ±20V.

5 Turn power off.

7. SLFA-20 ADJUSTMENTS & VERIFICATIONS

5-2. Filament current monitor adjustment

5-2-a. Preparation

1 This adjustment is carried out with the power unit installed in the chassis and the shutter base open (B adjustment status),

2 Install the SLFA-XHB-02 board, and attach the CN1, CN2, and CN5 terminals to the board.

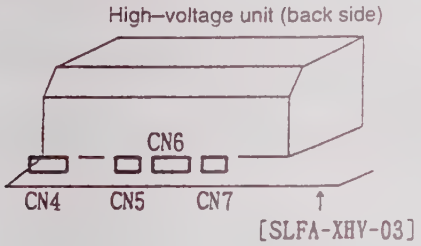


Fig.7-5-2 SLFA-XHV-02 board (back side)

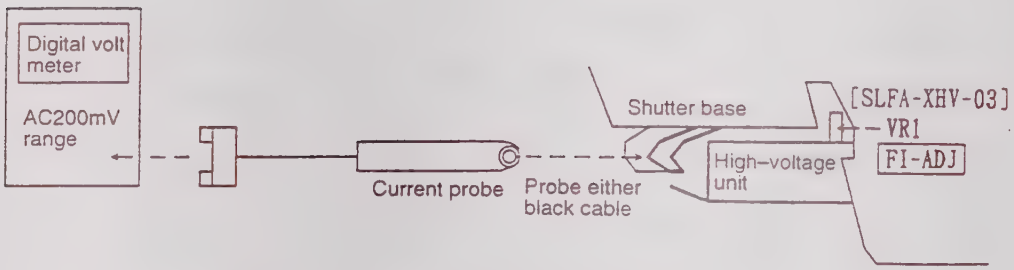


Fig.7-5-3 Filament current measurement

3 Setting the ranges for the adjustment:

Ref.▸▸▸ Fig.7-5-3

- Digital volt meter range: 200 mV AC

Note▸▸▸ Limited to some models.

Ref.▸▸▸ 1-2-b.

- Current prove range

Prove model	Range
PC-80	10 mA/mV
A622	100 mV/A

Note▸▸▸ Limited to some models.

Ref.▸▸▸ 1-2-b.

4 Attach one of the two black cables of the XHV unit with a current probe.

Ref.▸▸▸ Fig.7-5-3

5-2-b. Adjustment

1 Push in the two actuators at the cover switch to release the lock.

2 Disconnect the CN5 terminal on the SLFA-XHV-03 board (Ref.▸▸▸ Fig.7-5-2).

3 Turn the VR1[FI-ADJ] adjuster on the board all the way clock wise (18 revolutions) until it stops (Ref.▸▸▸Fig.7-5-3).

4 Turn power on.

5 Make sure that the reading on the digital volt meter is below AC13.00mV. If the reading is higher than this, the board has not been assembled correctly or there are faulty components which will not allow accurate control of the X-ray tube. In this case, execute the following procedure to protect the X-ray tube.

6 An error message will be output within 30 to 60 seconds accompanied by a buzzer. Look at the CHECK 1 screen and press the on-screen keys in the order shown below.

[F4] (EXIT) ⇒ [F4] (EXIT) ⇒ [F4] (MAINT) ⇒ [F3] (PAGE) ⇒ [F1] (CHECK1)

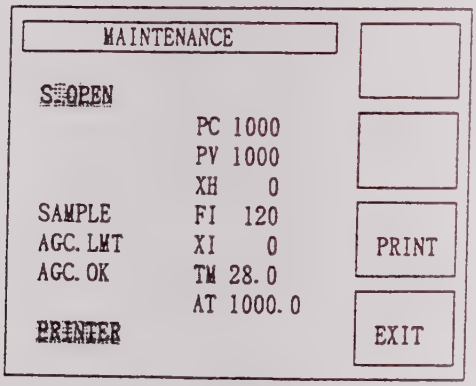


Fig.7-5-4 CHECK 1 Screen

7 Verify the FI reading on the display. It should be 120±5.

8 With the CN5 connector removed from the SLFA-XHV-03 board, pull out both cover switch actuators to lock the switch on. The X-RAY ON lamp will illuminate. Check the FI display again. With the X-RAY ON lamp illuminated, the FI readout should be 170±5

9 Current monitor adjustment:
Turn VR1 on the SLFA-XHV-03 board slowly to the left (counter clockwise) until the meter reads 1/10th of the value shown at FI (+1.50/-1.50 mV). For example, the meter should read between 18.15 and 15.50 mV for an FI display of 170.

Note▸▸▸ While it is desirable that the adjustment value be within ±0.05mV of the FI value. there are cases where the FI value will fall when the VR1 adjuster is turned to the left (counter clockwise). In this case. stop the adjustment before the FI value falls below 165. If the value on the meter is within the range stated above. there is no problem.

10 Verifying the adjustment:
With the adjustment having been executed as described in step 9 above, push in the two cover switch actuators to release the lock. Verify that the X-RAY ON lamp has gone out and check that the meter reads 1/10th of

7. SLFA-20 ADJUSTMENTS & VERIFICATIONS

the value shown at FI (±1.00mV). For example, if the FI display shows 120, the meter should read 12.00 ±1.00mVAC.

11 Ending the adjustment:
Turn power OFF if this is the last adjustment executed.
If you want to proceed to the X-ray discharge check test, leave the power ON and proceed.

5-3. X-Ray Discharge Check

5-3-a. Preparation

1 To prepare for X-ray discharge check, execute steps 2 through 7 below. If you are continuing from the previous filament monitoring current adjustment, you only need to verify steps 2 through 4 below.

2 The unit should be in the B adjustment status with the power unit attached to the chassis and the shutter base open.

3 Install the SLFA-XHV-02 board and attach the CN1, CN2, and CN5 connectors (**Ref.▸▸▸ Fig.7-5-1**).

4 Press in the two cover switch actuators to release the lock.

5 Connect the CN5 connector. The other connectors on the SLFA-XHV-03 board and the SLFA-20 board should be connected.

6 If you are continuing adjustment from the previous filament monitoring current adjustment (5-2), the CHECK 1 screen should be present as shown in **Fig.7-5-5**.

7 Turn the power off, and then turn it on again. An error message should appear 30 to 60 seconds later accompanied by a buzzer alarm. Look at the CHECK 1 screen by performing the following key operation.

F4 (EXIT) ⇒ F4 (EXIT) ⇒ F4 (MAINT) ⇒ F3 (PAGE) ⇒ F1 (CHECK1)

8 In the following adjustment, X-rays are generated and a survey meter is needed to check for X-ray leakage. The actual leakage test will be executed subsequently. The range of the survey meter (Aloka's TGS-121) shall be set to 10 CPS F.S.

9 Perform a background (B.G.) measurement (reading of the survey meter when the instrument is turned off).

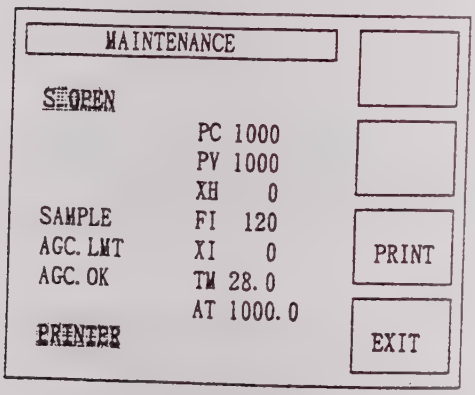


Fig.7-5-5 CHECK 1 screen

5-3-b. X-ray Discharge

1 Pull out the two cover switch actuators to lock the switch on.

2 X-ray will now be generated. First, verify that the survey meter reading is below B.G. + 10 CPS, and then perform the following adjustment and confirmation (a to f).

Note▸▸▸ The above standard cannot be applied to the products with the following manufacturing numbers:

SLFA-20: MFG Nos. 8904010101-8904010105
8904010201-8904010220

SLFA-20T: MFG Nos. 8905580101-8905580110

7. SLFA–20 ADJUSTMENTS & VERIFICATIONS

If the standard is satisfied, the following parts in the parts assemblage diagram should be replaced:

SLFA–20	S220012C01:	Nos. 3, 20, and 21 (one for each)
	S220013D01:	Nos. 15, 17, 42, 3, and 12 (one for each) and No. 40 (two)
SLFA–20T	S220012C01:	Nos. 3 and 21 (one for each)
	S220013D01:	Nos. 42, 3, and 12 (one for each)
	S220046D01:	Nos. 1, 91, 95, 50, and 33 (one for each)
	S220050B01:	No. 1 (one)

a. X–RAY ON lamp should be illuminated.

b. XH value should be 800 +8.

c. Digital voltmeter readings = (FI reading/10) + 0.05 mV (adjust by PCB [SLFA–XHV–03] VR1)

d. FI value should be 140 +10–15.

e. XI value should be 296 +10.

f. After the cover switch turns off, perform steps 3 through 6 below, and at this time, verify that VR1 does not move.

3 Verify the FI reading on the display. It should be 120±5.

4 With the CN5 connector removed from the SLFA–XHV–03 board, pull out both cover switch actuators to lock the switch on. The X–RAY ON lamp will illuminate. Check the FI display again. With the X–RAY ON lamp illuminated, the FI readout should be 170±5

5 Current monitor adjustment:
Turn VR1 on the SLFA–XHV–03 board slowly to the left (counter clockwise) until the meter reads 1/10th of the value shown at FI (+1.50/–1.50 mV). For example, the meter should read between 18.15 and 15.50 mV for an FI display of 170.

Note▸▸▸ While it is desirable that the adjustment value be within ±0.05mV of the FI value, there are cases where the FI value will fall when the VR1 adjuster is turned to the left (counter clockwise). In this case, stop the adjustment before the FI value falls below 165. If the value on the meter is within the range stated above, there is no problem.

6 Verifying the adjustment:
With the adjustment having been executed as described in step 9 above, push in the two cover switch actuators to release the lock. Verify that the X–RAY ON lamp has gone out and check that the meter reads 1/10th of the value shown at FI (±1.00mV). For example, if the FI display shows 120, the meter should read 12.00 ±1.00mVAC.

7 After the adjustment is completed, secure the VR1 adjuster on the SLFA–XHV–03 board with a silicon sealant (SE9188RTV). Leave power ON if your are proceeding to the next adjustment. Turn power OFF if your are finished.

6. INITIALIZING THE CPU

6-1. Preparation

If you are continuing adjustment operations from the previous section, press the F4 (EXIT) key and the READY screen will appear. If you have turned power off, the ready screen will appear in approximately 30 seconds after power is turned OFF and ON. Make sure that the two cover switch actuators have been pulled out to lock the cover switch on. This adjustment may be executed with the shutter base either open or closed (in either adjustment status).

6-2. Time setting

1 Press the F4 (MAINT) key and the F2 (DATE) key and the DATE screen will appear.

2 Input the YEAR, MONTH, DAY, HOUR, and MINUTE at the numerical keypad.

Note▸▸▸ The cursor can be moved down with the down arrow key. After setting the date and time, press the ENTER key to input the new data. The data will not register unless the ENTER key is used.

3 Press the F4 (EXIT) key the READY screen will appear.

6-3. Setting a temporary scale

Because there is no scale present in the unit at this time, a temporary scale must be input in order to execute the subsequent procedures.

1 Press the F3(CAL) and F2(MANI) keys on the READY screen, and the CAL(MANI) screen will appear.

2 Use the numerical key pad to input the following scale factors: A=0, B=2, C=0, L=0, H=5.

Note▸▸▸ Use the down arrow key to move the cursor. Press the ENT key after all values have been input. Values will not register without using ENT key.

3 Press the F4(EXIT) key and the input values will be printed out. The print out should appear as below (**Ref.▸▸▸ Fig.7–6–1.**).

- A=0, B=2, C=0
- L=0, H=5
- Current Date (year/month/day/hour/min)

```
**CALIBRATION-MAN1
 DATE:'95-11-22 21:14
 CAL#       :    1
 m/m%=A*K^2+B*K+C
      A=   0.00000
      B=   2.00000
      C=   0.00000
 RANGE:
 0.0000 - 5.0000 m/m%
  L↑              ↑H
```

Fig.7–6–1 CAL printout

7. SLFA-20 ADJUSTMENTS & VERIFICATIONS

7. AMP ADJUSTMENT

7-1. Preparation

1 Turn the power off.

2 Put the unit in B adjustment status with the power unit attached to the chassis and the shutter base open.

3 Pull out the two cover switch actuators to lock the switch on.

4 Open the test chamber cover (shutter will close).

5 The VR2[ZERO] and VR3[GAIN] adjusters on the SLFA-MCT-01 board should be at their centered positions (**Ref.▸▸▸ Fig.7-4-5**). Be careful not to touch the VR1[ZSHV] adjuster. The adjusters on the SLFA-MCT-01 board are set in their centered positions when the board is assembled, so there should be no need to move them.

6 Connect an oscilloscope. Make sure it meets the specifications listed in section 1-2-1 previously. The oscilloscope should be connected between the TP12[SIN] and TP11[AGND] terminals on the SLFA-MCT-01 board. The time range should be 1μs, and the voltage range 100mVDC.

7 Turn power ON and the LCD panel should appear as in **Fig.7-7-1**.

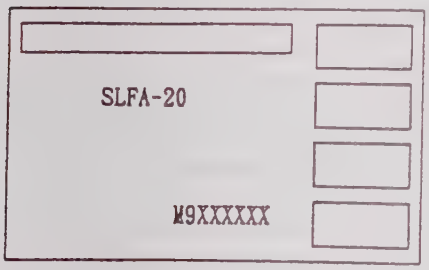


Fig.7-7-1 Opening screen

8 Within 10 seconds of power on, perform the following key operation;

[8] [1] [2] [1] [ENT]

9 Press the F1(MAINT) key on the maintenance selector screen (**Fig.7-7-2**).

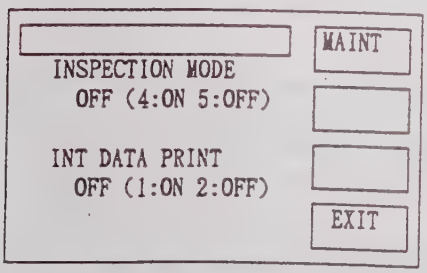


Fig.7-7-2 Maintenance selector screen

10 The maintenance mode screen (**Fig.7–7–3**) should appear followed by the screen as shown in **Fig.7–7–4** approximately 30 seconds later.

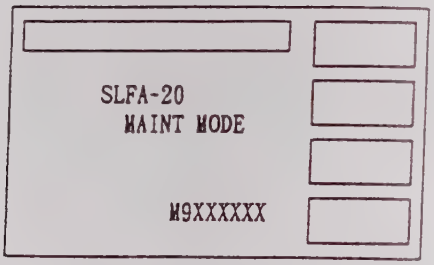


Fig.7–7–3 Maintenance Standby screen

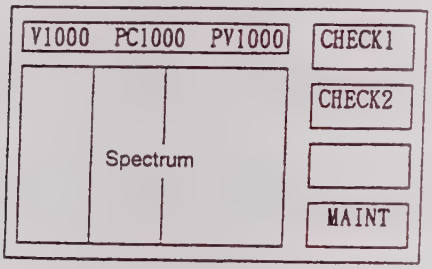


Fig.7–7–4 Maintenance mode screen

7. SLFA-20 ADJUSTMENTS & VERIFICATIONS

7-2. Adjustment

7-2-a. Baseline adjustment

1 Push in the two cover switch actuators and release (X-ray off).

2 The SIN signal will appear on the oscilloscope. Set the signal baseline to 0VDC with the VR2[ZERO] adjuster on the SLFA-SPR-03 board. There will be noise present, so set the signal as close as possible to the center value.

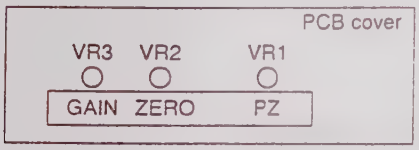


Fig.7-7-5 SLFA-SPR-03 board

7-2-b. Adjusting the X-ray waveform

1 After the operations explained in 7-2-a are performed, pull out the two cover switch actuators to engage the lock and turn on the X-rays (with the test chamber open).

2 The X-ray waveform will be triggered on the oscilloscope screen. Use the VR3[GAIN] and VR1[PZ] adjusters on the SLFA-SPR-03 board to set the waveform as shown in **Fig.7-7-6**. Be aware of the following points;

- Use the VR1[PZ] adjuster to set the waveform tail at 1.5μsec.
- The waveform will consist of two peaks. Use the VR3[GAIN] adjuster to set the high voltage peak at approximately 600mV.
- Repeat the adjustments described in 1 and 2 above to get the "A" waveform shown in **Fig.7-7-6**.
- If you get a waveform as shown in "D" or "E" of **Fig.7-7-6**. it indicates that the SLFA-SPR-03 board is defective.

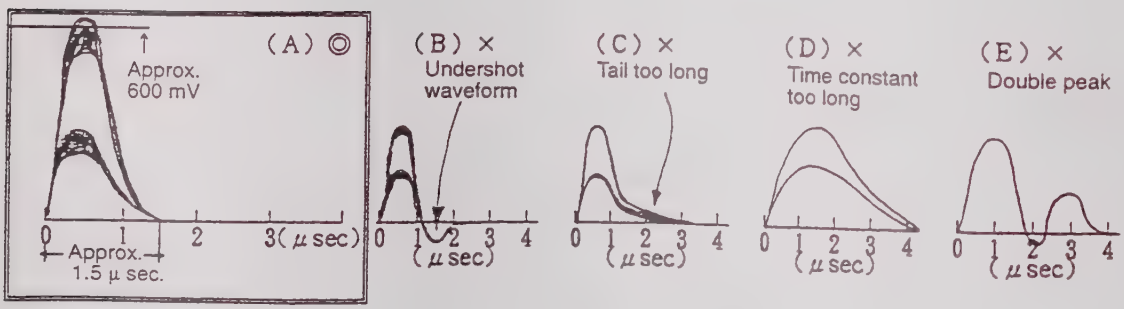


Fig.7-7-6 X-Ray waveforms

7-2-c. X–ray waveform gain adjustment

1 After performing the X–ray waveform adjustment in 7–2–b., adjust the gain phase using the VR3[GAIN] adjuster on the SLFA–SPR–03 board while viewing the spectrum on the Maintenance Mode Screen as shown in **Fig.7–7–7.** Adjust VR3 to center the right side peak on the B marker as displayed on the Maintenance Mode Screen.

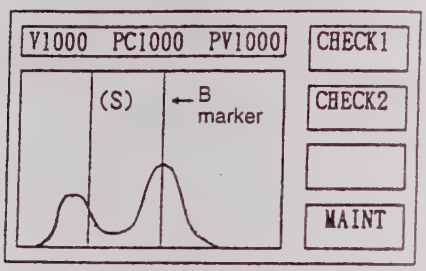


Fig.7–7–7 Maintenance mode screen

Points to be aware of:

- As there is a 10–second refresh rate for the spectrum display, wait for two screen refresh cycles after turning the VR3 adjuster to verify the adjustment.
- During this time, because the X–ray activated luminescent material is irradiating the test stage, the right side spectrum line represents phosphorous, and is differentiated from the left side (S) marker which represents sulfur.

7. SLFA–20 ADJUSTMENTS & VERIFICATIONS

8. CLOSING THE SHUTTER BASE

8-1. Checking the safety labels

Before closing the shutter base, make sure that the safety labels shown below are attached.

No.	Label type	Ref. figure	Location
1	High Voltage	8.1	SLFA–MCT–01 board shield
2	High Voltage	8.1	SLFA–XHV–02 board shield
3	High Voltage	8.1	Rear of high–voltage power supply
4	High Voltage	8.1	SLFA–SPR–03 board cover
5	Radiation	8.2	Rear of high–voltage power supply
6	Radiation	8.2	Left rear of shutter base
7	Toxic Material	8.3	X–ray tube holder
8	Toxic Material	8.3	Comparative analysis tube
9	Toxic Material	8.4	X–ray tube holder
10	Toxic Material	8.4	Comparative analysis tube

Fig.7–8–1 High Voltage Danger Label

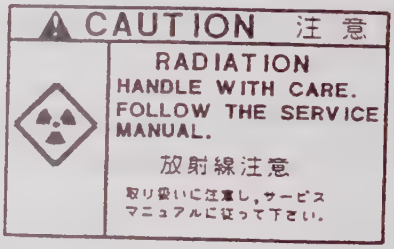


Fig.7–8–2 Radiation Danger Label

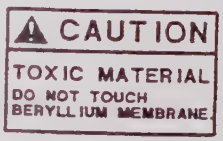


Fig.7–8–3 Toxic Material Label

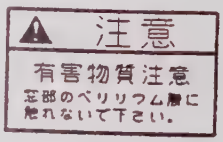


Fig.7–8–4 Toxic Material Label

7. SLFA-20 ADJUSTMENTS & VERIFICATIONS

8-2. Closing the shutter base

1 Removing the power cord from its connector will cause the shutter base to close.

2 Check that all wiring is routed and secured correctly (see assembly drawing). Make sure that no wiring interferes with the operation of the shutter base. Pay particular attention to the routing of the wires and cables listed below.

a. Ground wire on test chamber cover

b. Shutter ground wire

c. White high-voltage cable between SLFA-SPR-03 and SLFA-XHV-02

d. Signal cable between SLFA-XHV-02 and SLFA-XHV-03

e. Signal cable between SLFA-SPR-03 and SLFA-MCT-01

f. Signal cable between SLFA-MCT-01 and SLFA-SEN-01

3 Make sure that the shutter base closes with the tab on the SLFA-XHV-02 board inserting into the slot on the shutter base (see "A" of Fig.7-5-1).

4 Check that the test chamber cover opens and closes smoothly. If the wires a, b, and c in step 2 above are not routed correctly and secured, they may prevent smooth operation of the test chamber cover.

5 Secure the shutter base and the front panel with the screws.

6 Connect the power cord, and pull out the two actuators on the cover interlock switch to lock the switch on.

7. SLFA-20 ADJUSTMENTS & VERIFICATIONS

9. VERIFYING CHECK 1 MODE FUNCTIONS

9-1. Preparation

1 Turn the power on with the unit in the A adjustment status with the shutter base closed, and the cover interlock switch actuators pulled out (lock on).

2 Approximately 30 seconds after power on, the X-RAY ON lamp will illuminate and the READY screen will appear. Call up the CHECK 1 screen (**Ref.▸▸▸ Fig.7-9-1**) through the following key operations:

F4 (MAINT) ⇒ F3 (PAGE) ⇒ F1 (CHECK1)

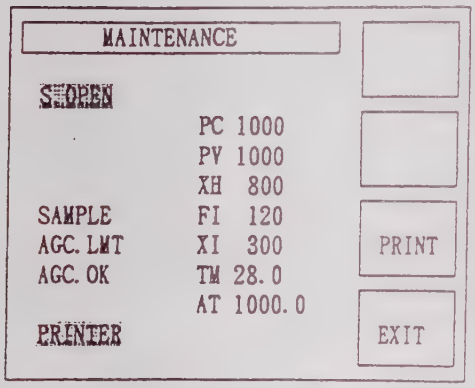


Fig.7-9-1 CHECK 1 Screen

9-2. Verification

9-2-a. Checking monitoring voltage

The monitoring voltages are displayed in the right column of the CHECK 1 screen. The voltage values should be as below:

PC = 1000 ±1 ← This value will appear quickly
PV = PC value ±1
XH = 800 ±8
FI = 140 ±10
XI = 296 ±10
TM = Temp in °C ±5 ← Current temp
AT = Barometric pressure in hPa ±10 ← Current pressure

9-2-b. Checking the status signals

Check the status signals on the left side of the CHECK 1 screen and the LED on the SLFA-MCT-01 board.

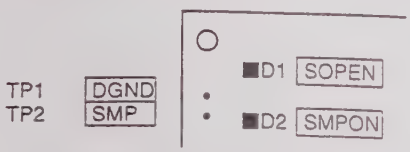


Fig.7-9-2 left rear of SLFA-MCT-01 board

1 S.OPEN (shutter open) signal

- When the test chamber cover is closed, the SOPEN ON will appear on the CHECK 1 screen and the D1[SOPEN] LED on the SLFA-MCT-01 board will illuminate (**Ref.▸▸▸ Fig.7-9-2**).

- When the test chamber cover opens, SOPEN OFF will appear on the CHECK 1 screen and the D1[SOPEN] LED on the SLFA-MCT.01 board will turn off.

2 SAMPLE signal

a. Set the oscilloscope to the following settings to view the sample waveform.

- Connect the oscilloscope between TP2[SMP] and TP1[DGND] on the SLFA-MCT-01 board (**Ref.▸▸▸Fig.7-9-2**).
- Set time range to 50μs/div
- Set voltage range to 500mV/div (DC)

b. Checking with a sample in the test chamber

- Place an empty test cell into the analysis position and close the test chamber cover. Do not forget to put the protective membrane in position. The waveform peak should be above 1.2V. SAMPLE ON should be present on the CHECK 1 screen, and the D2[SMPON] LED on the SLFA-MCT-01 board should be illuminated.

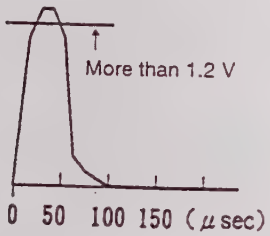


Fig.7-9-3 Waveform with sample in chamber

Checking with no sample in the test chamber

c. Remove the test cell from the chamber and close the test chamber cover. Do not forget to put the protective membrane in position. Set the oscilloscope voltage range to 100mV/div (DC). The waveform peak should be below 0.4V, SAMPLE OFF should be present on the CHECK 1 screen, and the D2[SMPON] LED on the SLFA-MCT-01 board should not be illuminated.

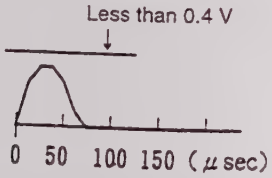


Fig.7-9-4 Waveform with no sample in chamber

3 AGC OK signal

With the test chamber cover open (shutter closed), exit and return to the CHECK 1 screen with the following key operations.

F4 (EXIT) ⇒ F4 (MAINT) ⇒ F3 (PAGE) ⇒ F1 (CHECK1)

The AGC.OK indicator should be OFF when the screen appears, and should go ON within 5 seconds.

4 AGC LMT signal

After checking the AGC OK signal (step 3 above), push in the two cover switch actuators and release (X-ray off). While doing this, watch the AGC.LMT indicator on the CHECK 1 screen. Before the cover switch actuators are pushed in, AGC.LMT OFF is displayed. When the actuators are pushed in and released, within 30 seconds, the AGC.LMT indicator should

7. SLFA-20 ADJUSTMENTS & VERIFICATIONS

go ON. At the time the indicator goes ON, the PC display should be 970 to 990 or 1010 to 1030.

5 PRINTER signal
With a printer connected, PRINTER ON is displayed on the CHECK 1 screen. With the printer cable disconnected, the indicator should go OFF. Turn the power off after checking.

10. SPECTRUM ADJUSTMENT & VERIFICATION

10-1. Zero noise check

1 With the shutter base closed and the two cover switch actuators pulled out (A adjustment status), perform operations 6 through 10 in section "7–1. Preparation" of "7. AMP ADJUSTMENT", and call up the Maintenance Mode Screen (**Ref.►►►Fig.7–10–2**).

2 Push in the two door switch actuators and release (X–ray off).

3 Check the oscilloscope and make sure that white noise is less than 150mVp–p (**Ref.►►►Fig.7–10–1**).

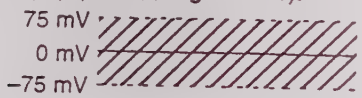


Fig.7–10–1 White Noise Check

10-2. Spectrum Position Adjustment

1 After performing the operations in procedure 10–1 above, put a heavy oil test cell (sulfur density of approx. 1m/m% by weight) in the test chamber and close the chamber cover.

2 Pull out the two door switch actuators (X–ray on). While watching the spectrum display on the Maintenance Mode Screen (Fig.7–10–2), adjust the spectrum position using the VR2[GAIN] and VR3[GAIN] adjusters on the SLFA–MCT–01 board (**Fig.7–4–5**). (Be careful not to touch the VR1[XSHV] adjuster.) Center the right side peak on the B line, and the left side peak on the S line.

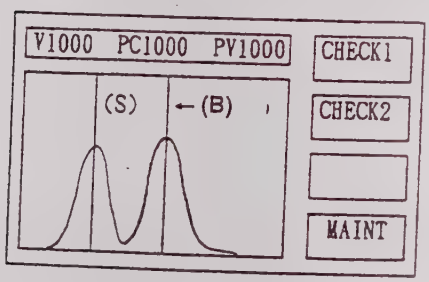


Fig.7–10–2 Maintenance Mode Screen

Cautionary points:

a. The let side spectrum is adjusted with the VR2[XERO] control, and the ride side with the VR3[GAIN]control. The controls must be turned repeatedly to get the correct adjustment.

b. Because the spectrum display has a 10–second refresh rate, wait for the screen to refresh two times after each adjustment cycle.

7. SLFA-20 ADJUSTMENTS & VERIFICATIONS

10-3. Calculation Rate Check

10-3-a. Calling up the INT DATA PRINT mode

1 With the shutter base installed and the unit in the A adjustment status, pull out the door cover switch actuators.

2 Turn power OFF and then ON. The screen will appear as shown in **Fig.7-10-3.**

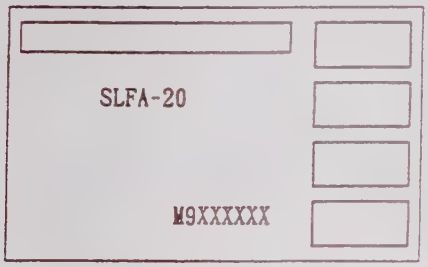


Fig.7-10-3 Opening Screen (SLFA58)

3 Within 10 seconds of power ON, perform the following key operation.

[8] [1] [2] [1] [ENT]

4 The Maintenance Selector screen will appear as shown in **Fig.7-10-4.** Press the [1] key.

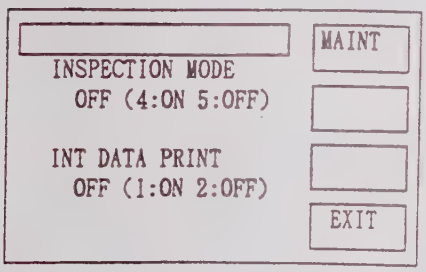


Fig.7-10-4 Maintenance Selector Screen (SLFA59)

5 Press the F4(EXIT) key to turn the INT DATA PRINT function ON.

6 In a few moments the X-RAY ON lamp will illuminate and the READY screen will appear.

10-3-b. Noise Check

1 Push in the two door switch actuators and release (X-ray off).

2 Set the heavy oil test cell (sulfur density of approx. 1m/m% by weight) and close the test chamber cover.

3 Perform a 10-second spectrum analysis, by performing the following key operations.

F4 (MAINT) ⇒ F1 (SPCTRM) ⇒10(SEC) ⇒ F1 (START)

4 Check that the spectrum printout is within the values listed below for S-INT, B-INT, and T-INT.

S-INT → less than 3cps
B-INT → less than 3cps
T-INT → less than 10cps

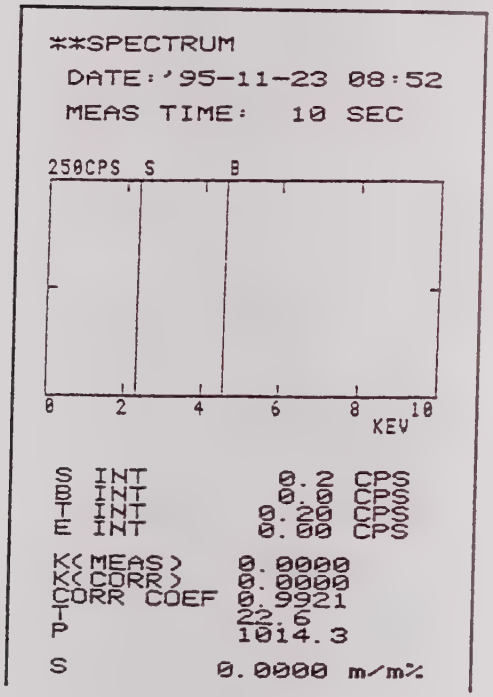


Fig.7-10-5 Noise check spectrum printout (SLFA60)

7. SLFA-20 ADJUSTMENTS & VERIFICATIONS

10-3-c.Spectrum Strength Check

1 The unit should be in the same condition as when the previous noise check was executed and should use the same heavy oil test cell.

2 Pull out the two door switch actuators (X-ray on).

3 Conduct a 10-second spectrum analysis as executed in the above **10-3-b** step 3.

4 The spectrum printout for S-INT and T-INT should conform to the requirements listed below.

S-INT → more than 2000cps
T-INT → more than 6500cps

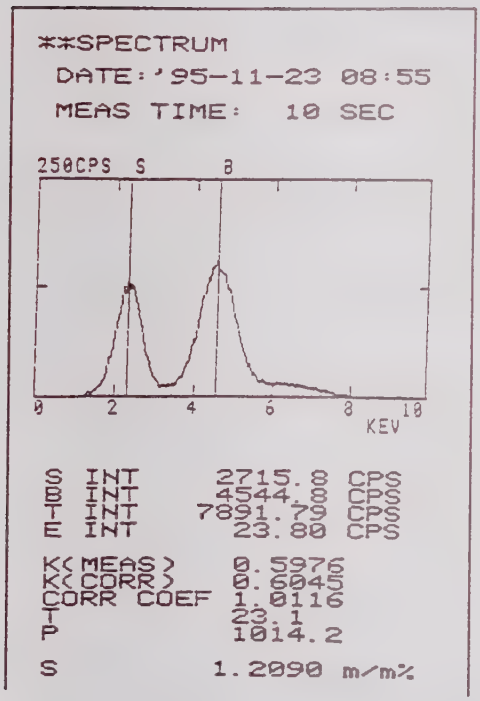


Fig.7-10-6 Spectrum strength check printout (SLFA61)

10-3-d. Background Check

1 The unit should be in the same condition as when the previous spectrum strength check (**10-3-c.**) was executed.

2 Pull out the two door switch actuators (X-ray on).

3 Place a test cell containing tap water in the test chamber and close the cover.

4 Conduct a 10-second spectral analysis as described in step 3 of **10-3-b.**

5 The spectrum printout for S-INT should be less than 1/4 of the S-INT value derived from the spectrum strength test as described in step 4 of **10-3-c** above. For example, if the S-INT value of the spectrum strength printout in **Fig.7-10-6** were 2715.8cps, the background S-INT value should be less than 679cps.

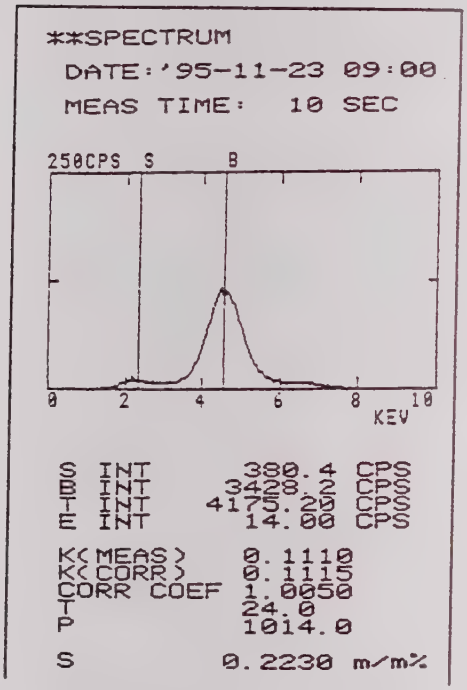


Fig.7-10-7 Spectrum background check printout

10-3-e. Inserting direction change of X-ray tube

1 Check the S-INT value meets with the standard described at **10-3-c.**

2 If the value does not meet the standard, remove the high pressured unit and rotate the inserting direction of X-ray tube by 180 degree.
(If the value meets the standard, this work is not required.)

Note▸▸▸ Be sure to turn off the power beforehand.

3 When this procedure is completed, check the calculation rate again from the procedure described from **10-3-a.**

7. SLFA-20 ADJUSTMENTS & VERIFICATIONS

11. CHECK 2 MODE OPERATIONS

1 The following operations are carried out with the unit in Adjustment status, the shutter base installed and the two cover switch actuators pulled out. If you are continuing adjustment work from a previous adjustment, you can leave the power on.

2 Place a test cell containing tap water in the chamber and close the cover.

3 Execute an AGC check from the CHECK 2 screen. (Refer to the AGC check operations described elsewhere is this manual.) You will get a 5 parameter spectrum printout for 5 PC values of 1000, 1025, 1050, 1075, and 1100. Use the printout to check that the peak is moving toward the right (high energy side) as the PC value increases.

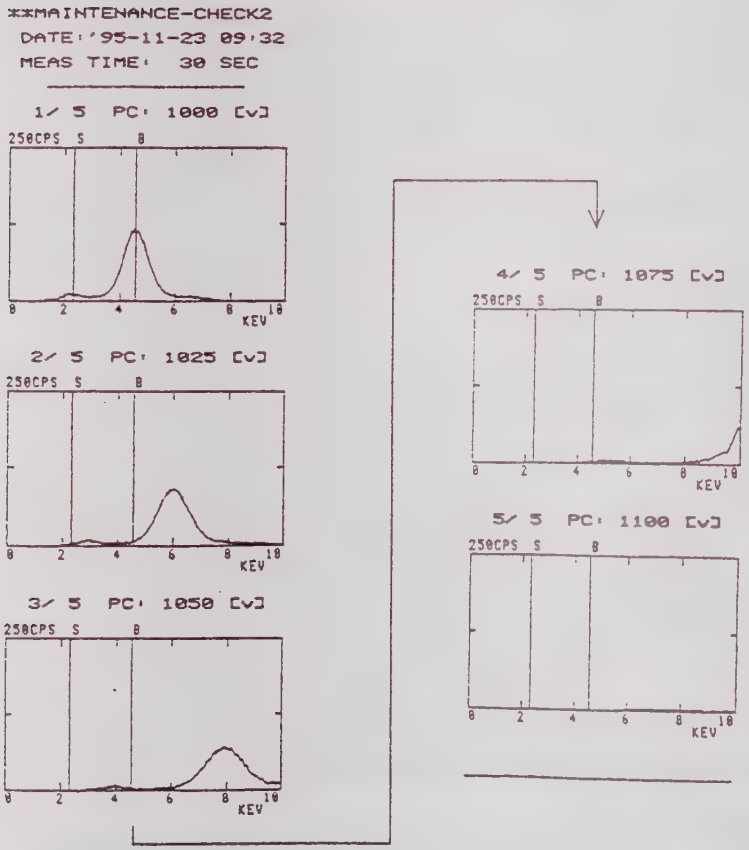


Fig.7-11-1 Five parameter spectrum printout in CHECK 2 mode

7. SLFA-20 ADJUSTMENTS & VERIFICATIONS

12. AGC FUNCTION VERIFICATION

1 This check is executed with the shutter base installed (A adjustment status) and the two door switch actuators pulled out.

2 Place a heavy oil test cell (sulfur density of approx. 1m/m% by weight) in the test chamber and close the cover.

3 Turn power OFF and then turn it ON. Call up the Maintenance Mode screen as described in items 7 through 10 of section 7–1.

4 Press the F2(CHECK 2) key on the screen and the following display will appear.

V 1020 PC 1020 (±1) PV 1020 (±1)

5 Turn power OFF and ON again and call up the CHECK 1 screen as described in items 1 and 2 of section 9–1.

6 When it changes to the CHECK 1 screen, the PC value should change from 1020 to 1000±2, and the AGC OK OFF should change to AGC OK ON.

7 Press the F4(EXIT) key to exit the screen, and then conduct a 10–second spectrum check analysis as described in item 3 of section 10–3–b. Check that the S and B peaks are positioned approximately 20% to the right of the S and B marker lines (**Ref.▸▸▸ Fig.7–12–1**, top).

8 Perform a standard 10–second spectrum analysis (see operating manual), and make sure that the analysis is completed without any problems.

9 Perform another spectrum check analysis as described in item 3 of section 10–3–b. Referring to the printout, check that the peaks of the S and B spectrum waveforms are aligned with the S and B spectrum marker lines (**Ref.▸▸▸ Fig.7–12–1**, bottom).

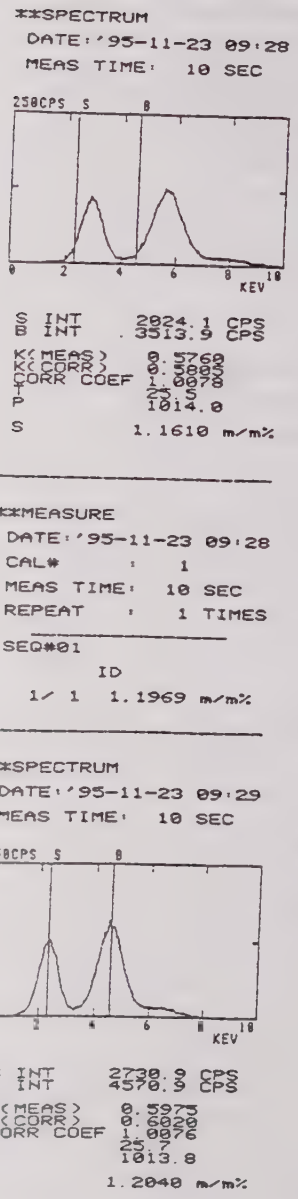


Fig.7–12–1 Spectrum waveform before and after AGC check

7. SLFA-20 ADJUSTMENTS & VERIFICATIONS

13. RS OUTPUT CHECK

13-1. Preparation

1 The RS output check is performed with the shutter base installed (A adjustment status) and the two door switch actuators pulled out. If you are continuing adjustment from the previous section, you can leave the power ON.

2 Connect the SLFA-20 board and printer. (Printer specifications listed in step 4 of section 1-2-2). The printer should be compatible with an RS-232C interface. Refer to operating instructions for more information.

3 Turn power ON and place the heavy oil test cell in the test chamber.

4 Perform one 10-second analysis. (Refer to the operating manual for information on setting up the analyzer for sample analysis.)

5 Set the ID to TEST-1. (Refer to the operating manual on ID setup procedure.)

13-2. Verification

Press the MEAS key to initiate the analysis. After completion, compare the SLFA-20 printout (**Fig.7-13-1**) and check printout (**Fig.7-13-2**). Verify that the values (1 through 18) on the check printout are within specification.

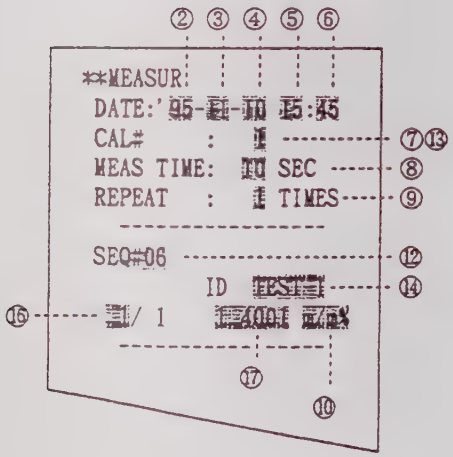


Fig.7-13-1 SLFA-20 printout

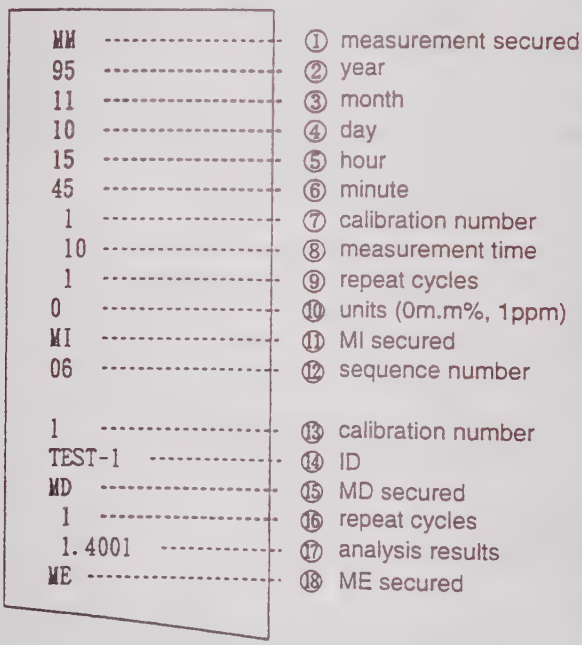


Fig.7-13-2 Check printout

14. INTERLOCK CHECK

14-1. Test chamber cover and shutter check

Verify that the shutter lever does not move when the test chamber cover is open.
Verify that the shutter closes instantly when the text chamber cover is opened.
Conduct these checks visually with the membrane protector unit removed.

14-2. X-ray interlock check

This check is conducted with the shutter base installed (A adjustment status) and the two cover switch actuators pulled out. Check the following items in order at the CHECK 1 screen (see step 1 and 2 in section 9-1).

1 XH should be less than 5 when a cover actuator switch is pushed in and released.

2 XH should be 800±10 when both cover switch actuators are pulled out.

3 XH should be less than 5 when the X-RAY ON lamp goes OFF.

4 XH should be 800±10 when the X-RAY ON lamp goes ON.

7. SLFA-20 ADJUSTMENTS & VERIFICATIONS

15. MISCELLANEOUS FUNCTIONS

15-1. Checking key action

Use the table below to conduct a key operation check. This check should be carried out before the cover is installed. If the shutter base opens during this test, perform the test again.

Sequence	Key Operation	Result
1	[POWER ON]	READY screen appears
2	[F1] (COND)	CONDITION screen appears
3	[F3] (REP)	REPEAT TIMES right value reverses
4	[2] [ENT]	REPEAT TIMES right value becomes "2"
5	[F4] (EXIT)	CONDITION screen appears
6	down and right arrow key	cursor moves 10 sec → 2 times → CAL #1
7	[F4](EXIT)	READY screen appears
8	[F2] (ID)	ID screen appears
9	[0] [.] [–] [1] [2] [3]	0 . – 1 2 3 characters appear
10	[C]	0 . – 1 2 3 are erased
11	[4] [5] [6] [7] [8] [9]	4 5 6 7 8 9 characters appear
12	[ENT]	4 5 6 7 8 9 characters remain displayed
13	[F4] (EXIT)	READY screen appears
14	[MEAS]	MEASURE screen appears

15-2. Checking LCD backlight ON/OFF function

1 Check that the backlight goes OFF when no key operations have been conducted approximately 50 seconds after power ON.

2 After the backlight goes OFF, check that it comes ON if a key operation is conducted.

Note▸▸▸ The backlight ON/OFF check should be conducted while the analyzer is in use, and not when the unit is first turned on.

7. SLFA-20 ADJUSTMENTS & VERIFICATIONS

16. COVER ATTACHMENT

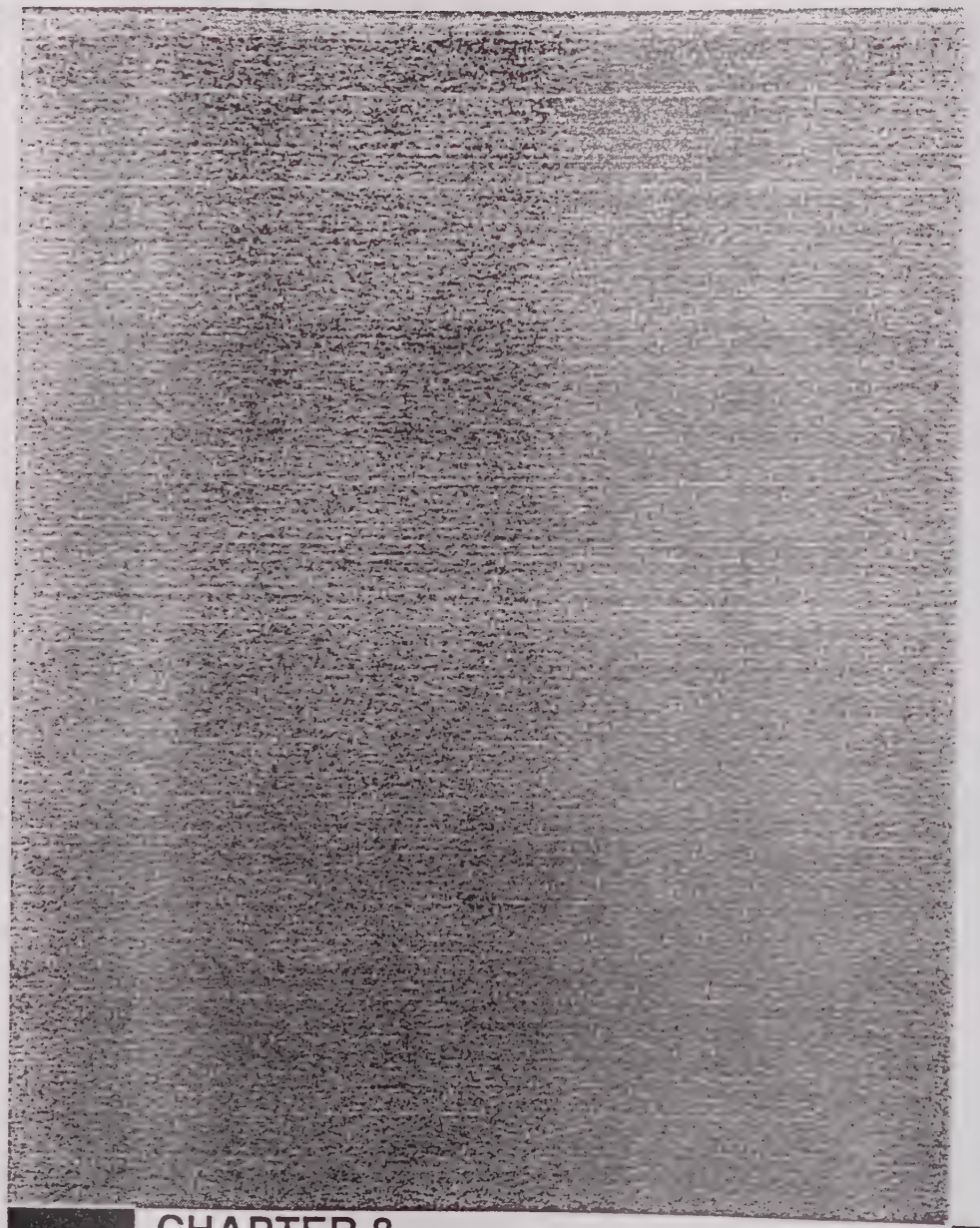
After all adjustment and check operations have been conducted (except for the backlight ON/OFF check), install the cover and connect the printer.

Note▸▸▸ Make sure that all wires are properly routed and secured before installing the cover. Do not forget to attach the lever grip.

NOTE

CHAPTER 8

SLFA–20T ADJUSTMENTS & VERIFICATIONS



CHAPTER 8

SLFA–20T ADJUSTMENTS & VERIFICATIONS

8. SLFA–20T ADJUSTMENTS & VERIFICATIONS

1. Introduction

The SLFA–20T (with turntable) comprises an analysis unit (the SLFA–20) and an auto sampler unit (ST–20). Adjustment and verification is broadly divided into the following categories.

- Adjustment and verification of the analysis unit (the SLFA–20)
- General combined adjustment and verification

Note▸▸▸ Unless otherwise specified, all numbers within circles refer to the illustration and pages 8–4, 8–5, and 8–6.

8. SLFA–20T ADJUSTMENTS & VERIFICATIONS

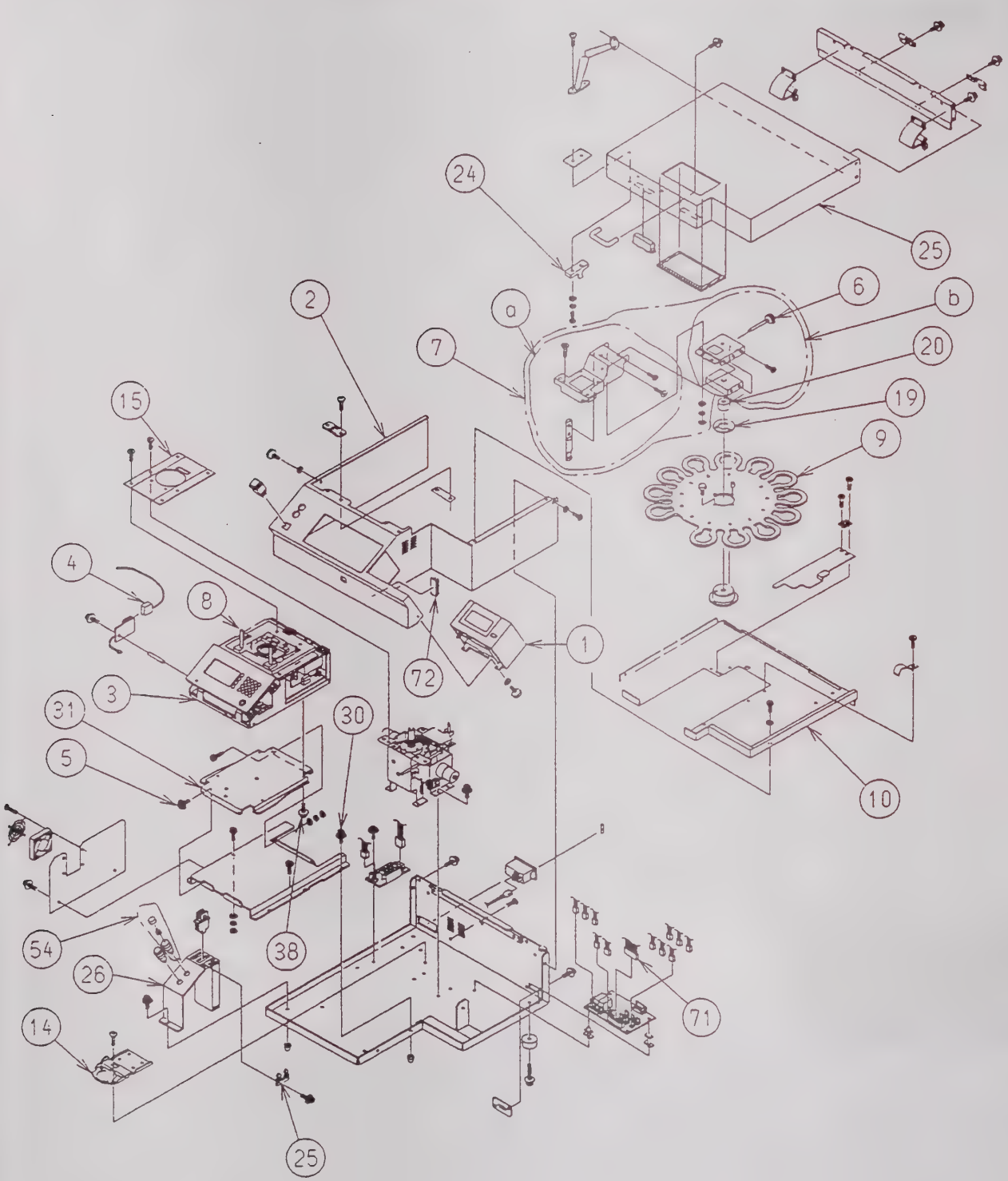


Fig.8–1

8. SLFA–20T ADJUSTMENTS & VERIFICATIONS

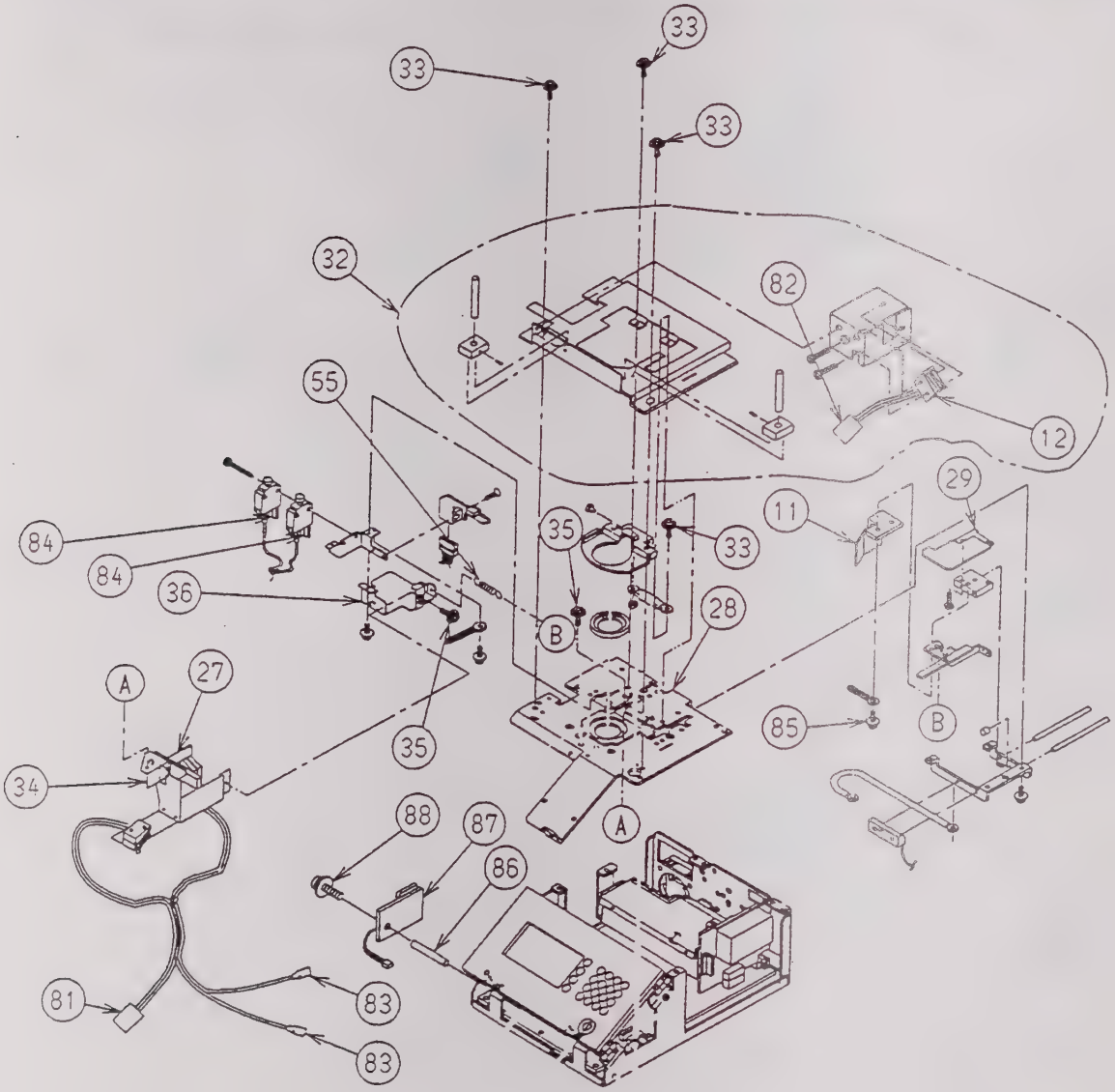


Fig.8–2

8. SLFA-20T ADJUSTMENTS & VERIFICATIONS

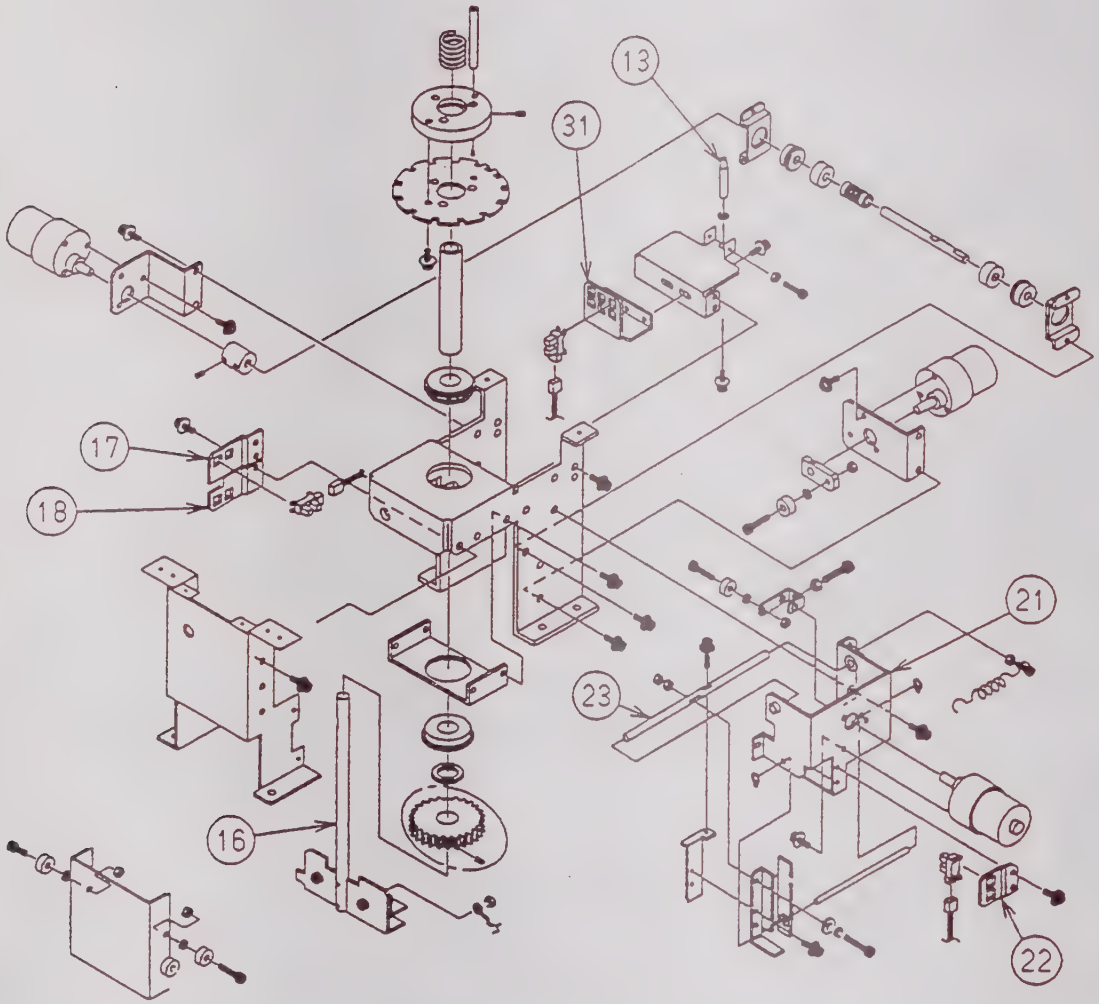


Fig.8-3

8. SLFA-20T ADJUSTMENTS & VERIFICATIONS

2. Adjustments & Verification of the Analysis Unit (SLFA-20)

2-1. Removing the Analysis Unit

1 After turning off to the SLFA-20, remove the power cable.

2 Remove the printer unit ① and remove the cover ②. Loosen the retaining screw 6 and remove the chamber cover ⑦.

3 Remove the power cable, printer cable, and X-RAYS ON lamp cable ④ for the analysis unit (SLFA-20)③.

4 Remove the two retaining machine screws ⑤ for the analysis unit.

5 Remove the analysis unit③.

2-2. Adjustment & Verification Preparations for the Analysis Unit

- Ver. 1 Ver. 2

1 Disassemble the chamber cover into a and b. Attach the shaft ⑧ to a only and perform adjustment procedures.

Note▸▸▸ Be sure to install the sample chamber cover. and avoid accessing behind the cover. X-ray exposure may be resulted when the power is turned on without the sample chamber cover.

2 Insert the power cable for the SLFA-20T into the power inlet for the analysis unit and install the X-RAYS ON lamp cable ④.

- Ver. 3 Ver. 4

1 Disassemble the sample chamber cover into 'a' and 'b'.

2 Attach the 'a' part and the adjusting plate ⑭ to the measurement unit.

Note▸▸▸ Be sure to install the sample chamber cover. X-ray exposure may be resulted if the power is turned on without the cover.

Note▸▸▸ Be sure to install the adjusting plate. X-ray will be leaked from the back side of the sample chamber cover if the power is turned on without the plate.

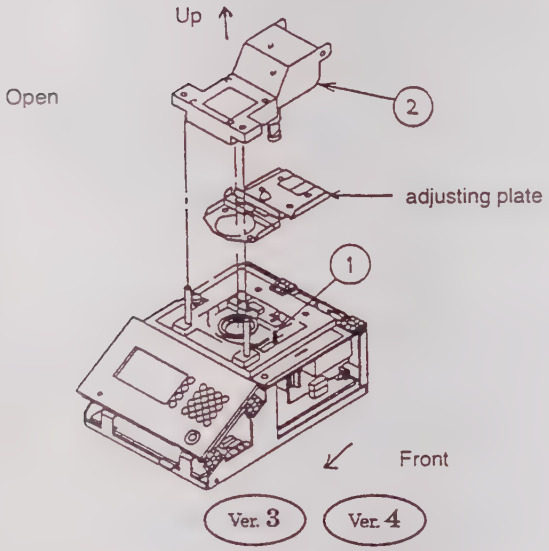
3 Connect the POWER cable of the SLFA-20T to the POWER inlet of the measurement unit, and install the X-RAYS ON lamp cable ④.

⚠ CAUTION	⚠ 注 意
RADIATION In adjusting the analysis unit, install the adjusting plate and the chamber cover. (See the service manual.)	放射線注意 計測部単体調整をする時は必ず調整板と試料室カバーを取り付けること。 サービスマニュアルに従うこと。

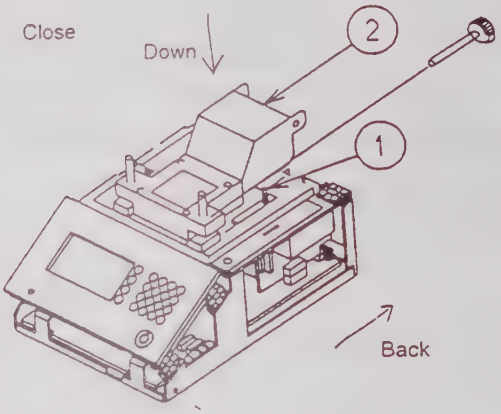
8. SLFA-20T ADJUSTMENTS & VERIFICATIONS

2-3. Adjustment & Verification for the Analysis Unit

The adjustment and verification procedures are the same as steps 3 to 15 of chapter 7 for the SLFA-20. Except the chamber cover ⑦-a for the analysis unit of the SLFA-20T is different from the SLFA-20. The opening and closing of the chamber cover for the SLFA-20T is as shown below.



Pull the lever ① forward and the shutter will close. At this time, remove the chamber cover ② upwards.



By placing the chamber cover ② downwards, the lever ① falls backwards and the shutter opens.

Fig.8-4

8. SLFA-20T ADJUSTMENTS & VERIFICATIONS

2-4. Adjustment & Verification of the Shutter Open/close SW and Lock SW

1 Pull and lock the X-ray cover SW of the SLFA-20, and connect the X-RAYS ON lamp cable.

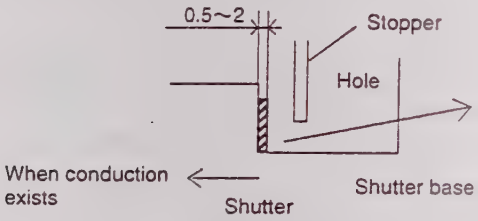
2 Pull out the power code and remove the chamber cover.

3 Remove the [XHV-02] CN2 connector of the SLFA-20.

4 Measure the resistance of the 4-pin and 5-pin of the connector with a tester. (Cable connector side)

5 Remove the CHAMBER COVER DOWN SWITCH ⑫ connector.

6 Adjust the SW pusher ⑪ so that the resistance value switches between 0 and 1 while the shutter ㉙ sticks out of the hole on the shutter base ㉘ from 0.5 to 2 mm.



In adjusting SW pusher, adjust the lever so that the distance from the lever to the shassis at the measuring unit is within 4.5 mm to 5.5 mm where the shutter is open.

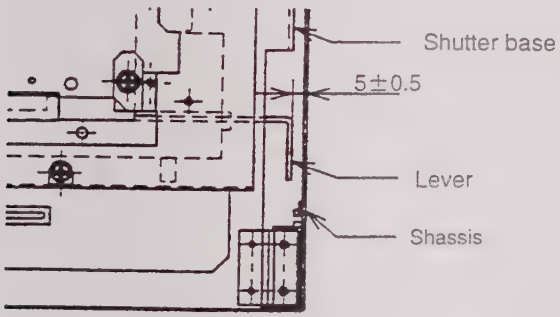


Fig.8-5

7 Reconnect the CHAMBER COVER DOWN SWITCH ⑫ connector.

8 Using a screwdriver, turn on the CHAMBER COVER DOWN SWITCH.

9 Push the stopper ㉗ with a ruler.

8. SLFA-20T ADJUSTMENTS & VERIFICATIONS

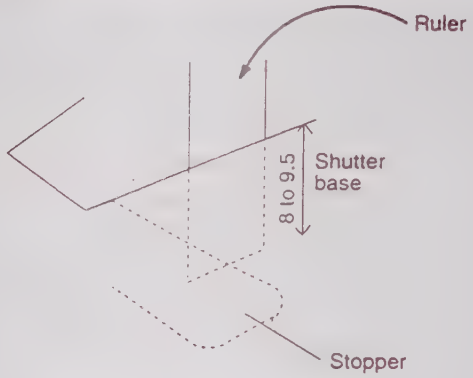


Fig.8-6

10 Verify that resistance value switches between 0 and 1 at 8 to 9.5 mm from the top surface of the shutter base.

11 Close the shutter and verify that it is locked. (Verify that the stopper raises.)

12 Return the [XHV-02] 5-pin to its original position.

2-5. Attaching the Analysis Unit

Attach by reversing the procedures in 2-1 and 2-2

3. General Combined Adjustment and Verification

3-1. Explanation of Turntable Operations

We begin with an explanation of turntable operations, which are broadly divided into rotation and elevator operation.

3-1-a. Turntable Rotation

Explanation:

1 The following conditions must be satisfied in order for the turntable to rotate.

- The sampler cover must be closed and the SAMPLER COVER DOWN light on the control panel lit.
- The turntable and test chamber cover must be in their upper positions and the T.UP indicator (LED) on MDF–07 lit.
- The shutter must be closed and the S.CLOSE indicator (LED) on MDR–07 lit.

2 The notches on the sector wheel are used to establish the turntable position.

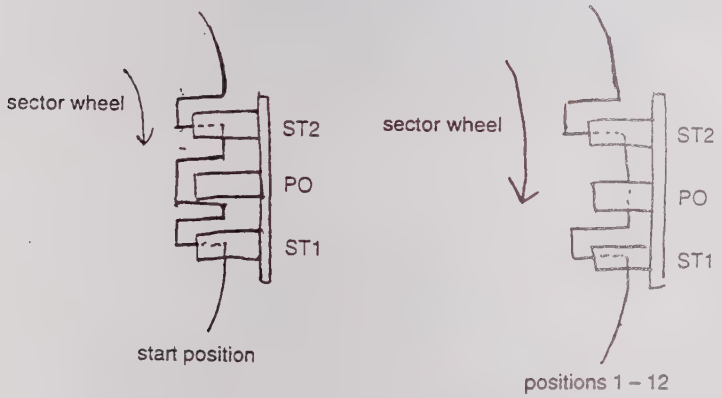


Fig.8–7

- The strobe position is established when the centers of the ST1 and ST2 sensors are simultaneously exposed by the two sector wheel notches, at which time the ST LED on MDR–07 turns on. If the PO sensor is also exposed by a notch at this time, the start position is established. After the turntable begins rotating from the start position, the strobe positions are verified sequentially, beginning with position 1 and continuing through position 12.

8. SLFA-20T ADJUSTMENTS & VERIFICATIONS

The current position is indicated by LEDs [SD0] through [SD3] on MDR-07.

Position No.	SD0	SD1	SD2	SD3	Code
1	ON	OFF	OFF	OFF	1
2	OFF	ON	OFF	OFF	2
3	ON	ON	OFF	OFF	3
4	OFF	OFF	ON	OFF	4
5	ON	OFF	ON	OFF	5
6	OFF	ON	ON	OFF	6
7	ON	ON	ON	OFF	7
8	OFF	OFF	OFF	ON	8
9	ON	OFF	OFF	ON	9
10	OFF	ON	OFF	ON	10
11	ON	ON	OFF	ON	11
12	OFF	OFF	ON	ON	12
start	ON	OFF	ON	ON	13
start	OFF	OFF	OFF	OFF	0

Note▸▸▸ The start position is indicated by codes 0 and 13: by code 13 when the [CONTINUOUS ROTATION] display on the control panel is on, and code 0 when it is not. The state of the [CONT] LED on MDR-07 mirrors that of the [CONTINUOUS ROTATION] display. The CPU executes continuous operation depending on whether the current position is code 0 or 13.

3-1-b. Turntable elevator operation

Explanation

1 Turntable rising is executed in the following sequence.

- The shutter motor turns on → the [MM3. ON] LED on MDR–07 turns on
- The shutter closing sensor turns on → the [S. CLOSE] LED on MDR–07 turns on
- The shutter motor turns off → the [MM3. ON] LED on MDR–07 turns off
- The elevator motor turns on → the [MM2. ON] LED on MDR–07 turns on
- The upper sensor turns on → the [T. UP] LED on MDR–07 turns on
- The elevator motor turns off → the [MM2. ON] LED on MDR–07 turns off
- Rising operations will not execute properly unless the shutter closing and upper sensor positions have been adjusted correctly.

2 Turntable lowering is executed in the following sequence.

- The elevator motor turns on → and the [MM2. ON] LED on MDR–07 turns on
- The lower sensor turns on → and the [T. DOWN2] on MDR–07 turns on
- The elevator motor turns off → the [MM2.ON] LED on MDR–07 turns off
- The shutter motor turns on → the [MM3.ON] LED on MDR–07 turns on
- The shutter opening sensor turns on → the [S.OPEN] LED on MCT–01 turns on
- The shutter motor turns off → the [MM3.ON] LED on MDR–07 turns off
- Lowering operations end → the [T.DOWN] LED on MDR–07 turns on
- Lowering operations will not execute properly unless the lower and shutter opening sensor positions has been adjusted correctly.

3 Interference with turntable elevator operation by an object

- If the turntable's elevator operation is interrupted by an object that has become jammed inside the mechanism, use a small screwdriver to press the RESET button on the back of the unit. This will reverse Motor ② (the elevator motor), allowing the operator to remove the object.

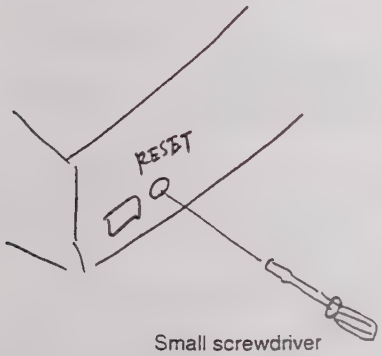


Fig.8–8

8. SLFA–20T ADJUSTMENTS & VERIFICATIONS

3-2. Combined adjustment and verification

3-2-a. Reassembly of the SLFA–20 unit

With attachment

- Reassembly the SLFA–20 unit.
- Connect the SLFA–20's power and printer cables.
- Set the protective unit in place.

Without attachment

- Do not attach the cover.
- Do not attach the inner cover ⑩ and the test chamber cover ⑦.
- Remove the positioning pins ⑬.

3-2-b. Adjusting the power unit

1 Disconnect the wire from the CN10 terminal on MDR–07.
2 Make sure that a 2A(T) fuse is in the power module. There should be two fuses, including one spare.
3 Connect the power cable to the inlet and measure the insulation resistance. This should be at least 100 MΩ at DC 1,000 V.
4 Check the power supply of the connector (CONTINUOUS ROTATION) plugged into CN10 on MDR–07. The power should be DC 24 V ± 1 V.
5 Verify that the fan is rotating.

3-2-c. Position adjustment

1 If the SLFA–20 cover switches are locked in the ON (i.e., raised) position, turn off by pressing and then releasing.

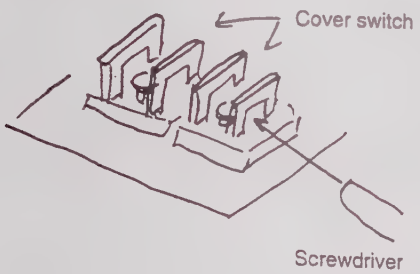


Fig.8–9

2 Manually turn on the sampler cover down switch.
3 Turn on the power. The turntable begins rotating, and a moment later an error is registered. Press F4 (EXIT) as many times as are needed to get the "READY" display.
4 Verify that the X–RAYS ON lamp is off.
5 Go to the "CHECK1" display.
6 Press F1 (NXTPOS) to go to position 1. This lowers the turntable. Loosen the six screws ㉚ and move the SLFA–20 unit so that the holes in the turntable are aligned with the test sample stage.

8. SLFA–20T ADJUSTMENTS & VERIFICATIONS

7 Move the SLFA–20 in the fore–aft direction. If there is significant misalignment in the lateral direction, move the position sensor plate, then press F1 (NXTPOS) to go to position 2 and repeat adjustment there.

8 Press F1 as many times as are needed to return the turntable to the start position.

9 Next, assemble the sample cell (inner and outer frames only) and place it on the test sample stage upside–down.

10 Insert the positioning pin ⑬ and tighten the screw loosely.

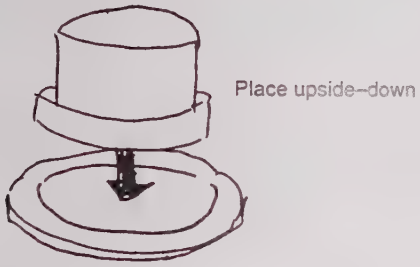


Fig.8–10

11 Press F1 (NXTPOS) to go to position 1. When the turntable is in the lowered position, with the sample cell protruding through the hole in the turntable, hold down the turntable and tighten the positioning pin.

Fig.8–11

12 Press F1 (NXTPOS) to go to positions 1 through 12 and verify that the sample cell passes through the hole without contacting the turntable. If the sample cell contacts the turntable, readjust.

13 Next, remove the cell from the test sample stage and place it at position 1. When it reaches the measurement position, verify that the various components are positioned relative to each other as they are in the illustration to the left. Do the same for positions 2 through 12.

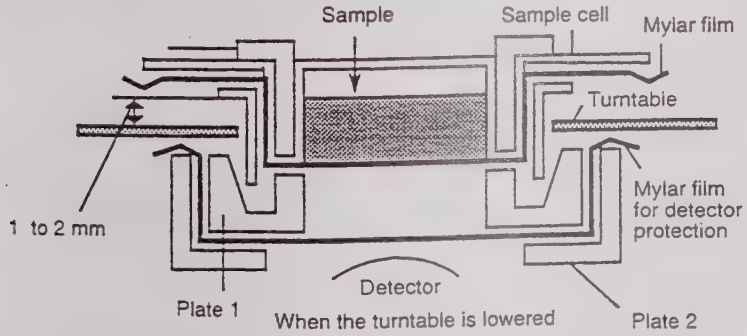


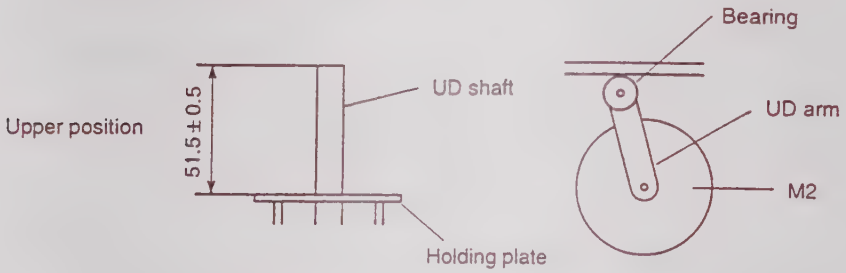
Fig.8–12

8. SLFA-20T ADJUSTMENTS & VERIFICATIONS

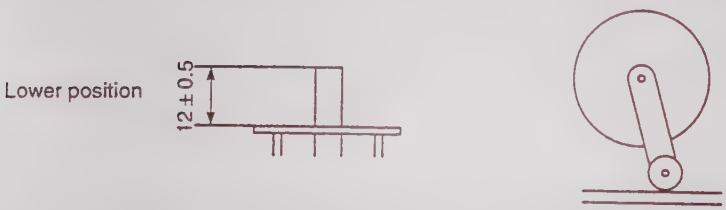
3-2-d. Adjusting the turntable's elevator operation positions

1 Press F2 (UP/DN) to move the turntable and lower the UD shaft ⑯. (Loosen the die pusher's screw ⑳ beforehand.)

2 Adjust the upper UD sensor ⑰ and lower UD sensor ⑱ so that when F2 is pressed and the UD shaft first begins to move from the stationary state, it moves roughly 1 mm upward (from the upper position) or downward (from the lower position). The UD shaft ⑯ should be 51.5 mm ±0.5 mm above the holding plate in the upper position and 12 mm ±0.5 mm above the holding plate ⑲ in the lower position.



The UD shaft should move upward roughly 1 mm when it first begins to move



The UD shaft should move downward roughly 1 mm when it first begins to move

Fig.8–13

3 Attach the turntable ⑨ with the UD shaft in the lower position.

4 Place the sample in the turntable's sample hole and tighten the die pusher so that there is a gap of roughly 1.5 mm between the sample and the turntable.

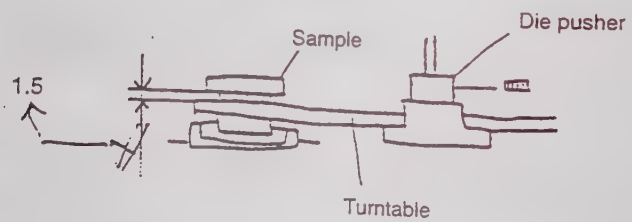


Fig.8–14

5 Press F1 (NXTPOS) to move the turntable and verify that the sample enters the protective unit correctly, and that a gap of 1 to 2 mm between the sample and the turntable is maintained. Readjust if there is rotational misalignment or if the vertical gap closes.

8. SLFA-20T ADJUSTMENTS & VERIFICATIONS

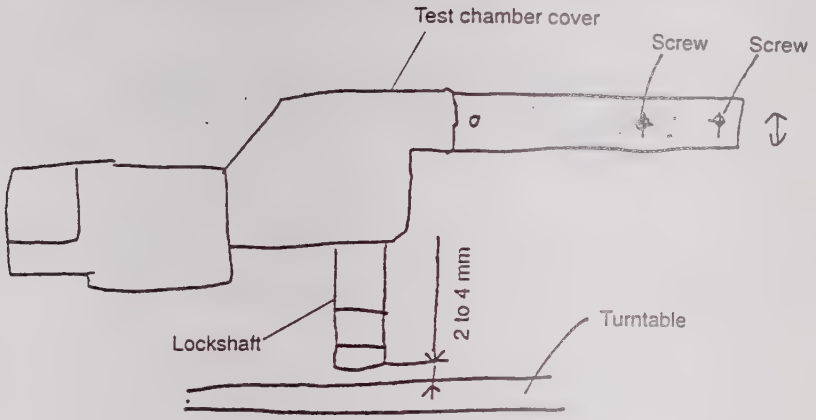


Fig.8–15

6 With the UD shaft raised, attach the test chamber cover ⑦. Make sure there is a gap of 2 to 4 mm between the lockshaft and the turntable ⑨. If the gap is too narrow, adjust by loosening the screws shown in the illustration and those on the opposite side.

3-2-e. Adjusting the connecting plate

1 Remove the turntable and the test chamber cover and connect the connecting plate ⑮ to the adjusting plate ⑭.

2 Loosen the connecting plate's six mounting screws, position the connecting plate so that its hole is aligned with the protective unit, then tighten the screws.

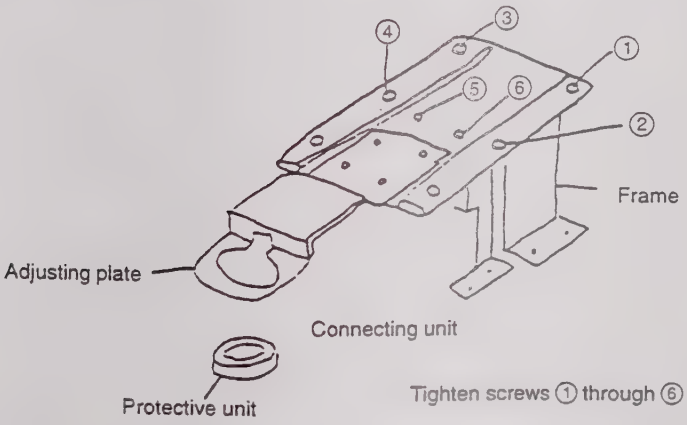


Fig.8–16

3 Remove the adjusting plate and connect it to the chasis. The purpose of this adjustment procedure is to pre–align the connecting plate with the sample plate. This makes it possible to adjust and verify positions without having to attach the adjusting plate to the connecting plate and then rotate the turntable after removing and then re–attaching the analysis unit.

8. SLFA-20T ADJUSTMENTS & VERIFICATIONS

3-2-f. Adjusting the shutter positions and the CHAMBER COVER DOWN switch

1 Lock the X-ray cover switch in the ON (i.e., raised) position. Verify that the X-ray lamp lights.

2 Remove the turntable ⑨ and attach the test chamber cover.

3 Align the CHAMBER COVER DOWN switch with the test chamber cover and attach.

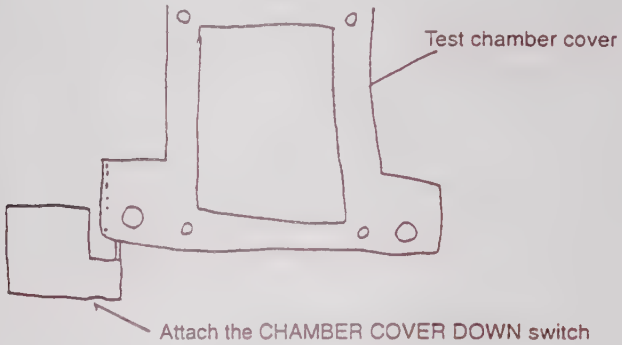


Fig.8-17

4 Press UP/DN to lower the arm and run the shutter motor.

5 Check the positions of the shutter.
Adjust so that there is 0.5 mm to 1.0 mm of movement in the opposite direction when movement is initiated from the sensor off position. Adjust by turning the M3 stay's screw ㉑ when the shutter is open and the SC sensor plate's screw ㉒ when the shutter is closed. The gap between the M3 stay and the shutter should be 46.5 mm ± 0.5 mm when the shutter is open and 10 mm ± 0.5 mm when the shutter is closed.

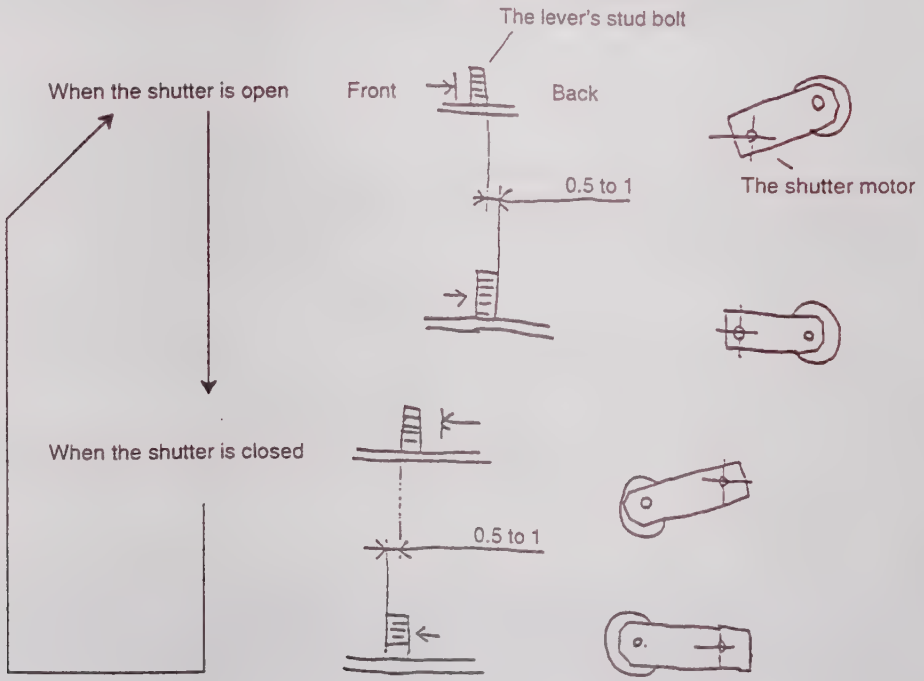


Fig.8-18

8. SLFA-20T ADJUSTMENTS & VERIFICATIONS

Fig.8-19

6 Close the shutter.
Remove the protective film, and confirm that the mark-off line of the shutter is invisible from the base window. (Ver. 3) (Ver. 4)

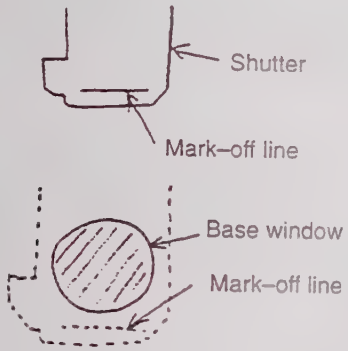


Fig.8-20

7 Lower the test chamber cover. Verify that the X-ray lamp lights.
8 Loosen the screws on the test chamber cover.

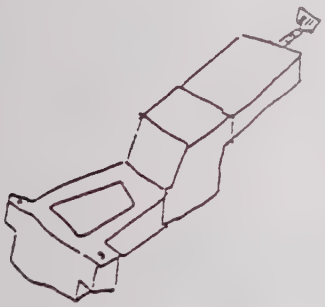


Fig.8-21

8. SLFA-20T ADJUSTMENTS & VERIFICATIONS

9 Lift the test chamber cover about 2 mm and tighten the switch attachment at the position where the X-ray lamp turns off.

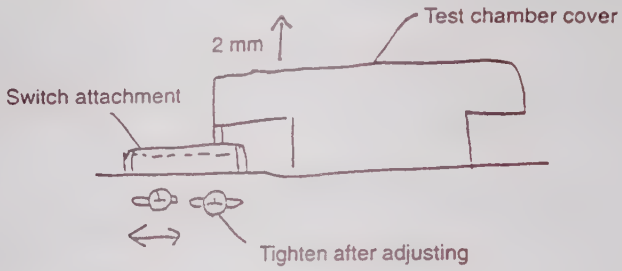


Fig.8-22

10 Lift the test chamber cover beyond that point and verify that it is locked in place by the lockshaft.

The cover should not open even if the screws are loosened.

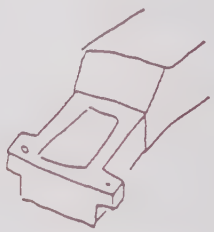


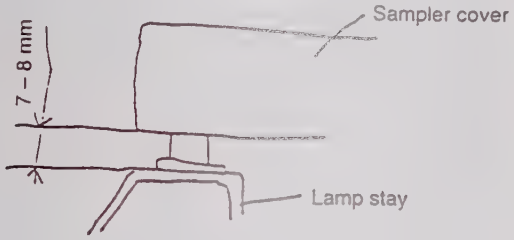
Fig.8-23

8. SLFA–20T ADJUSTMENTS & VERIFICATIONS

3-2-g. Adjusting the roller catches

1 Adjust the upper roller catch ㉔. Adjust the catch so that the sampler cover closes smoothly when lowered straight down.

2 Adjust the lower roller catch ㉕. Adjust the position so that there is a gap of 7 mm to 8 mm between the sampler cover and the lamp stay when the catches are engaged.



3 Attach the inner cover ⑩, cover ②, and the printer ①.

4 Pass the flat cable ⑦① through the cable clamp ⑦② and connect the each continuous rotation SW cable.

5 Raise the sampler cover by the handle and verify that it will not open too readily (i.e., with a force of 2 kgf or less), and that the SAMPLER COVER DOWN lamp does not turn off.

3-2-h. General verification of operations

1 With with unit completely assembled, turn on the power. Open the sampler cover, override the SAMPLER COVER DOWN switch, and place a sample on the turntable.

2 After the turntable comes to a stop in the maintenance position, verify that the X–ray lamp is lit.

3 With the test chamber cover lowered, loosen the screws in the arm.

4 Manually lift the test chamber cover and verify that the X–ray lamp turns off, and that the test chamber cover is locked in place by the lockshaft.

5 Tighten the test chamber cover's screws and press F2 (UP/DN) to raise the test chamber cover.

6 Remove the test chamber cover.

7 Press F2 (UP/DN) to lower the UD shaft.

8 Verify that the shutter is locked in place by the stoppers, and that the X–ray lamp turns off when the shutter strikes the stoppers.

9 Verify that the sample is securely inside the protective unit, and that there is a gap between the sample and the turntable. Perform this procedure for positions 1 through 12.

NOTE

CHAPTER 9

REPLACING

CHAPTER 9

REPLACING

9. REPLACING

1. Replacing the X-Ray Tube

1-1. Replacement procedure

1 Turn power the off. Disassemble the unit to access the X-ray tube.

2 Loosen the screw ⑱, and remove the wiring holder ⑲.

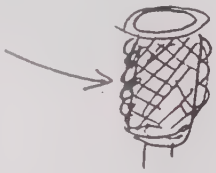
Ver. 3 Ver. 4

3 Loosen the screws ① to ⑥, open the key seat unit ⑭, and open the shutter base ⑦.

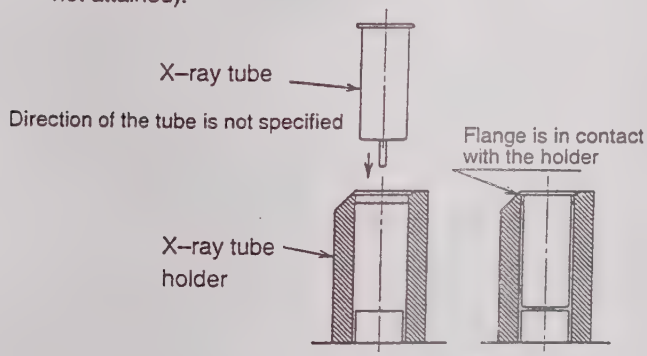
4 Loosen the screws ⑧ to ⑫, and remove the XHV unit ⑬.

5 Loosen the screw ⑮, remove the collimator ⑰, and replace the X-ray tube ⑯.

Note▸▸▸ The X-ray tube and the hole of the X-ray tube holder must be coated with the F022925600 (SH4) grease with a thickness of about 0.5 mm. Excessive grease should be wiped off.



Note▸▸▸ Before installing the X-ray tube, insert only the X-ray tube into the X-ray tube holder. Confirm that the flange of the tube is in contact with the tube holder (the tube wobbles if the contact is not attained).



6 Reassemble the unit in the reverse order.

9. REPLACING

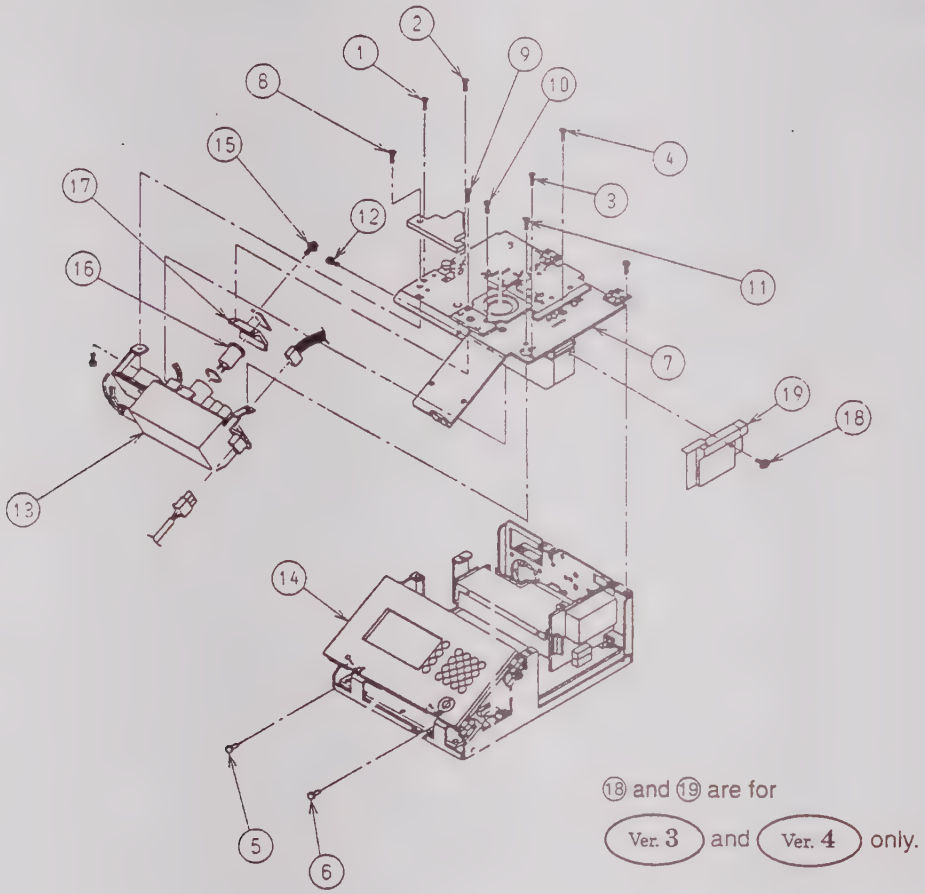


Fig.9–1 Replacing the X–ray tube

1-2. Verifying operation after replacement

After installing a new X–ray tube, a function check must be run in the CHECK 1 mode (**Ref.**▸▸▸ Chapter 7 section 9) and a spectrum adjustment and verification must be conducted (**Ref.**▸▸▸ Chapter 7 section 10).

Note▸▸▸ Please do not throw away the old X–ray tube. Always send it back to Horiba.

9. REPLACING

2. Replacing the Proportional Counter

2-1. Replacement procedure

- Ver. 1 Ver. 2

1 Turn power the off. Disassemble the unit to access the proportional counter.

2 Loosen the screws ① to ⑥, open the key seat unit ⑭, and open the shutter base ⑦.

3 Loosen the screws ⑧ to ⑪ and remove the proportional counter unit.

4 Loosen the screws ⑯ and ⑰ and remove the tube holders ⑬ and ⑮.

5 Replace the proportional counter and the high-voltage part of the proportional counter must be coated with a silicone rubber compound (SE 9188 RTV).

6 Reassemble the unit.

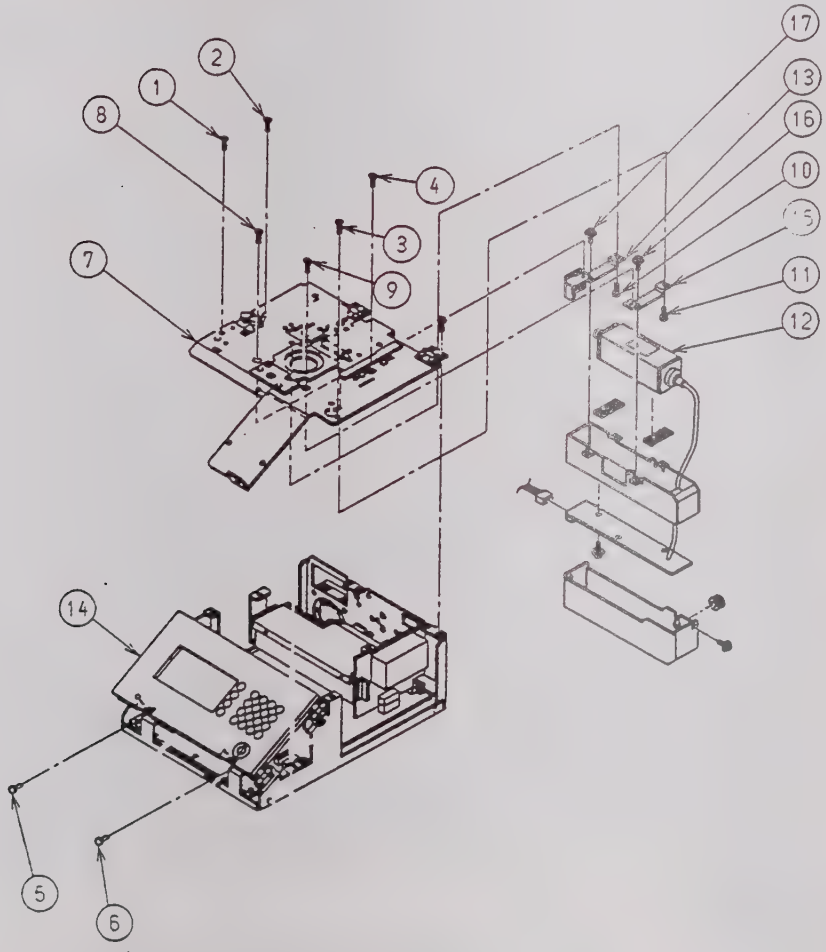


Fig.9-2 Replacing the proportional counter Ver. 1 Ver. 2

9. REPLACING

- Ver. 3 Ver. 4

1 Turn power the off. Disassemble the unit to access the proportional counter.

2 Loosen the screw ⑱, and remove the wiring holder ⑲.

3 Loosen the screws ① to ⑥, open the key seat unit ⑭, and open the shutter base ⑦.

4 Loosen the screws ⑧ to ⑪ and remove the proportional counter unit.

5 Loosen the screws ⑯ and ⑰, remove the tube holder ⑮, and replace the proportional counter ⑫. Apply silicone rubber compound (SE9188RTV) on the high–voltage part.

6 Reassemble the unit.

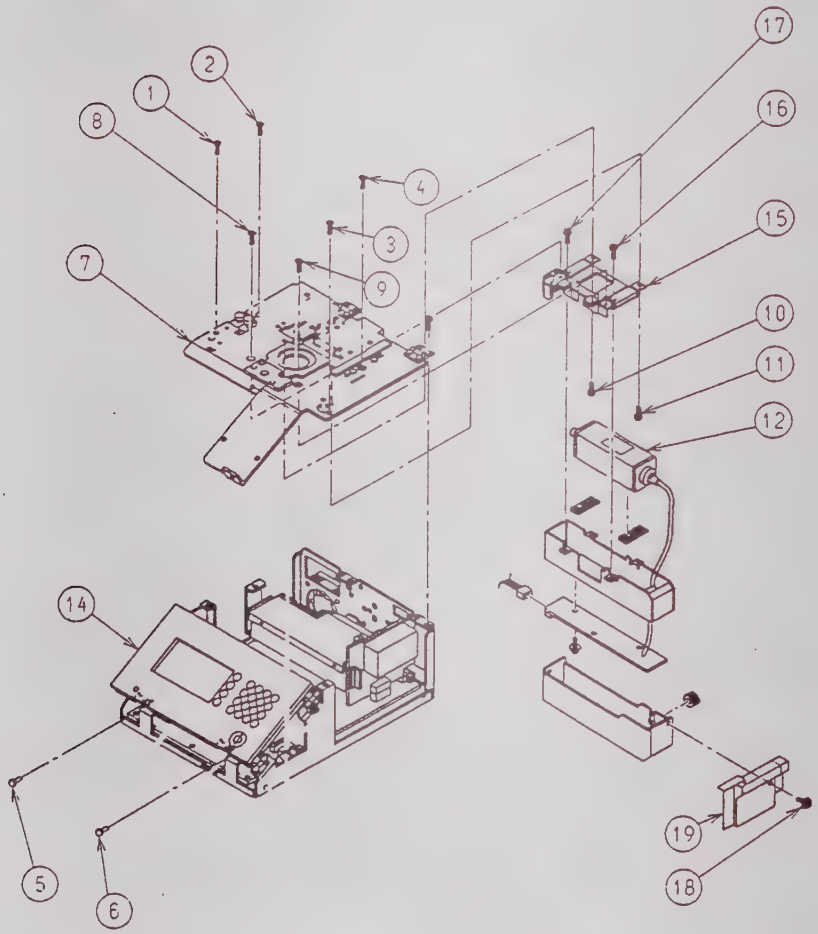
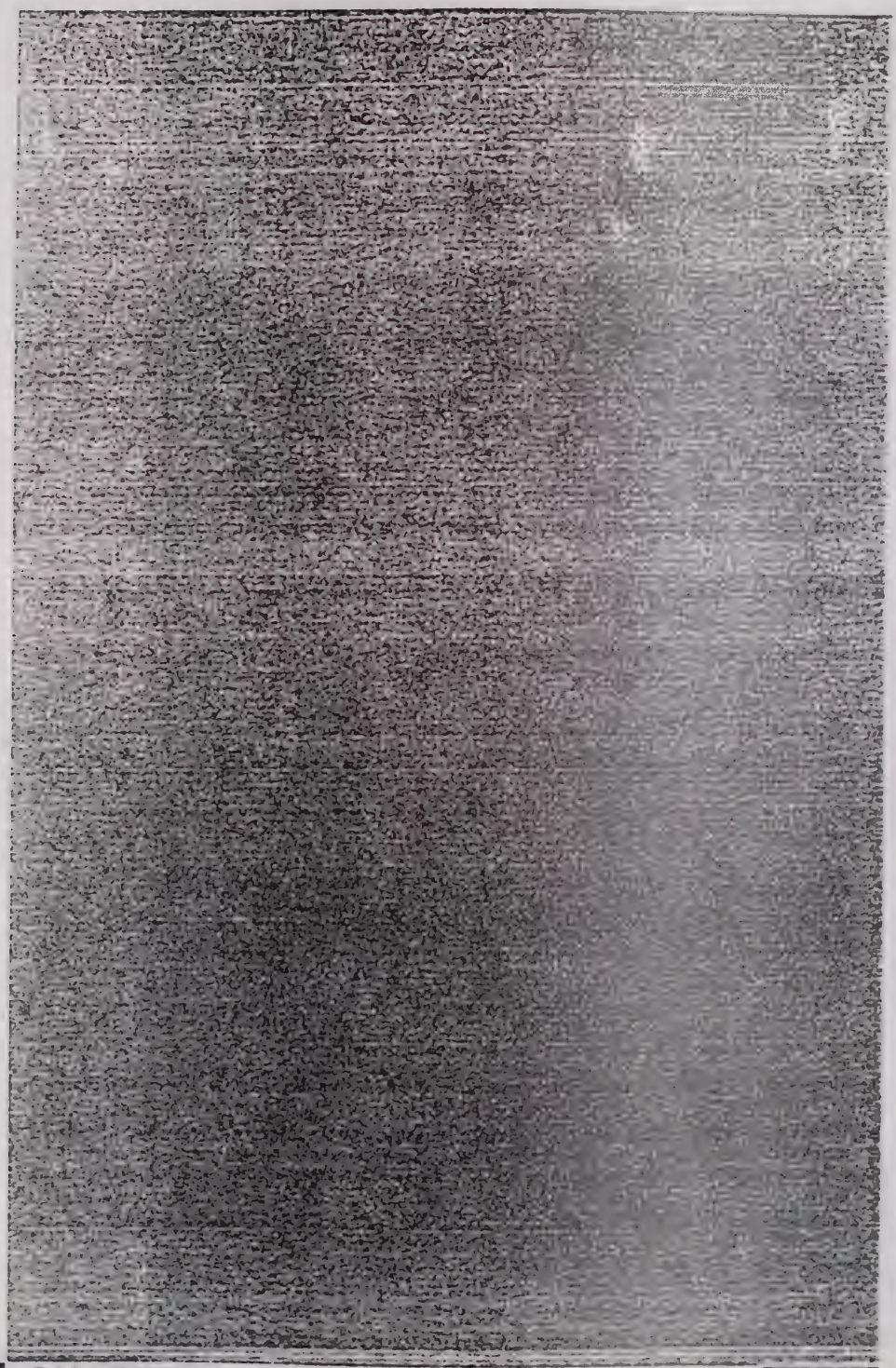


Fig.9–3 Replacing the proportional counter Ver. 3 Ver. 4

2-2. Verifying operation after replacement

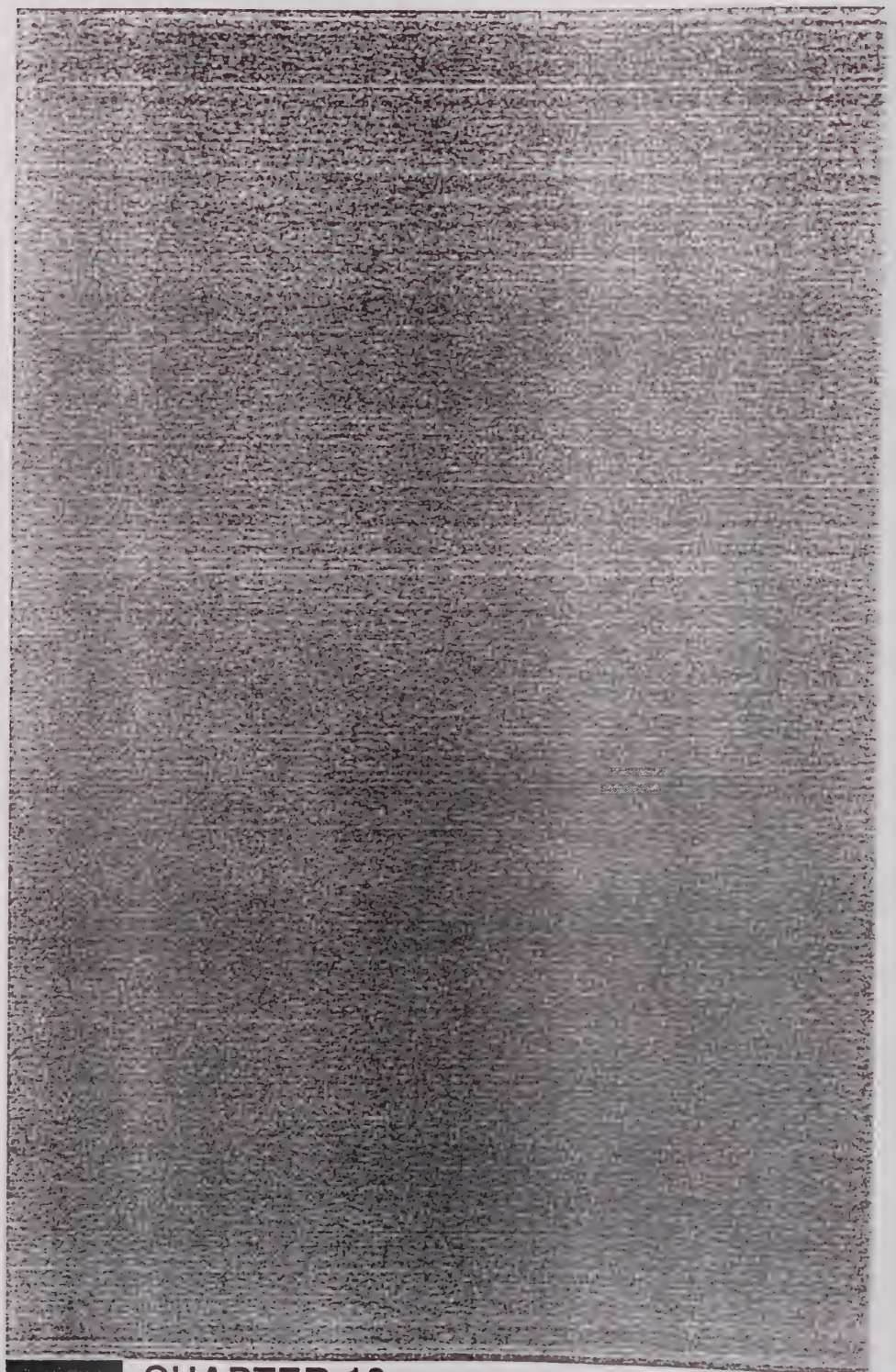
After installing a new proportional counter, follow the adjustment and verification procedures for the SLFA–20 unit from Chapter 7 section 7 (AMP ADJUSTMENT) through Chapter 7 section 12 (AGC FUNCTION VERIFICATION).

Note▸▸▸ Please do not throw away the old proportional counter. Always send it back to Horiba.



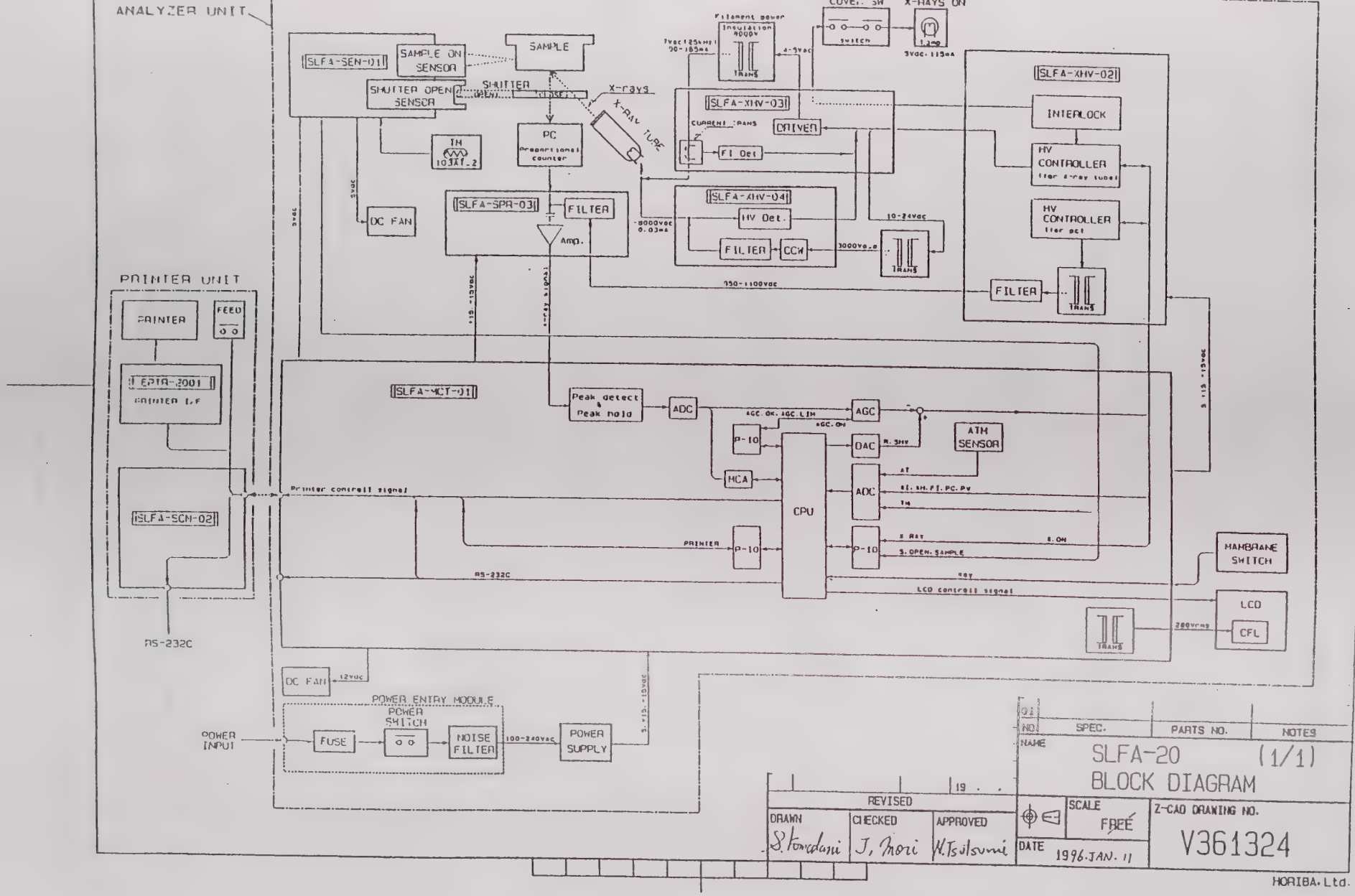
CHAPTER 10

WIRING DIAGRAMS AND CIRCUIT DIAGRAMS



CHAPTER 10

WIRING DIAGRAMS AND CIRCUIT DIAGRAMS



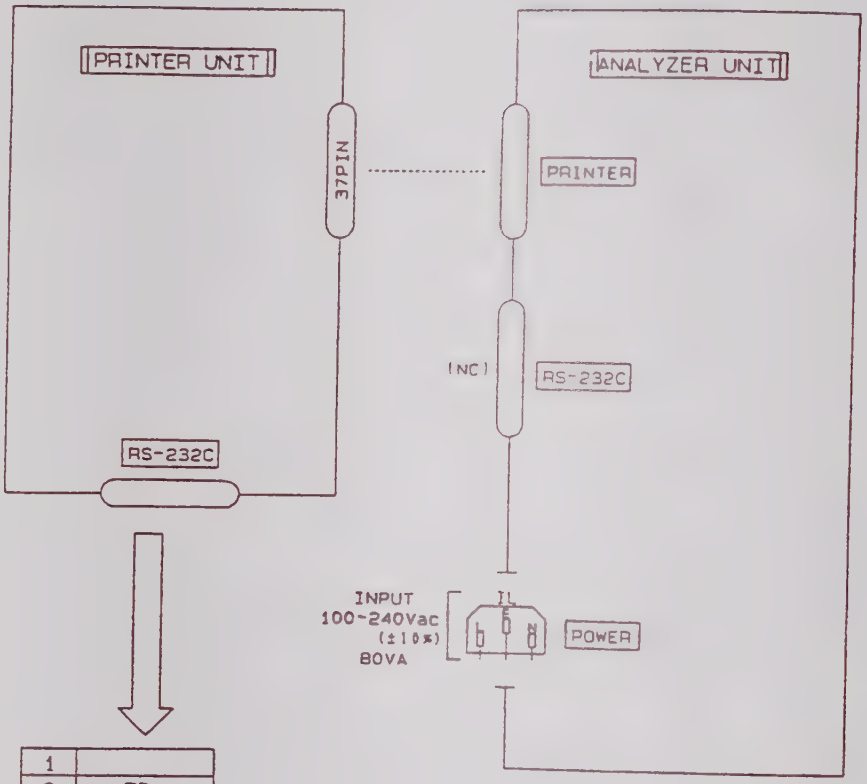
NO.	SPEC.	PARTS NO.	NOTES
NAME	SLFA-20 BLOCK DIAGRAM		(1/1)

REVISED 19 . .			SCALE	Z-CAD DRAWING NO.
DRAWN	CHECKED	APPROVED	FREE	V361324
S. Tomidasi	J. Mori	M. Tsutsumi	DATE 1996.JAN.11	

HORIBA, Ltd.

Z-CAD DRAWING NO.

EXTERIOR DRAWING



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2	RD
3	SD
4	
5	SG
6	
7	(RS)
8	(CS)
9	

(DSUB-9P)

NO.	SPEC.	PARTS NO.	NOTES
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NAME

SLFA-20
WIRING DIAGRAM

REVISED		
Changed "WIRING DIAGRAM"	S. Komatani	1995. Nov. 16

DRAWN	CHECKED	APPROVED
S. Komatani	T. Mori	N. Tsutsumi

SCALE FREE

DATE 1995. Nov. 16

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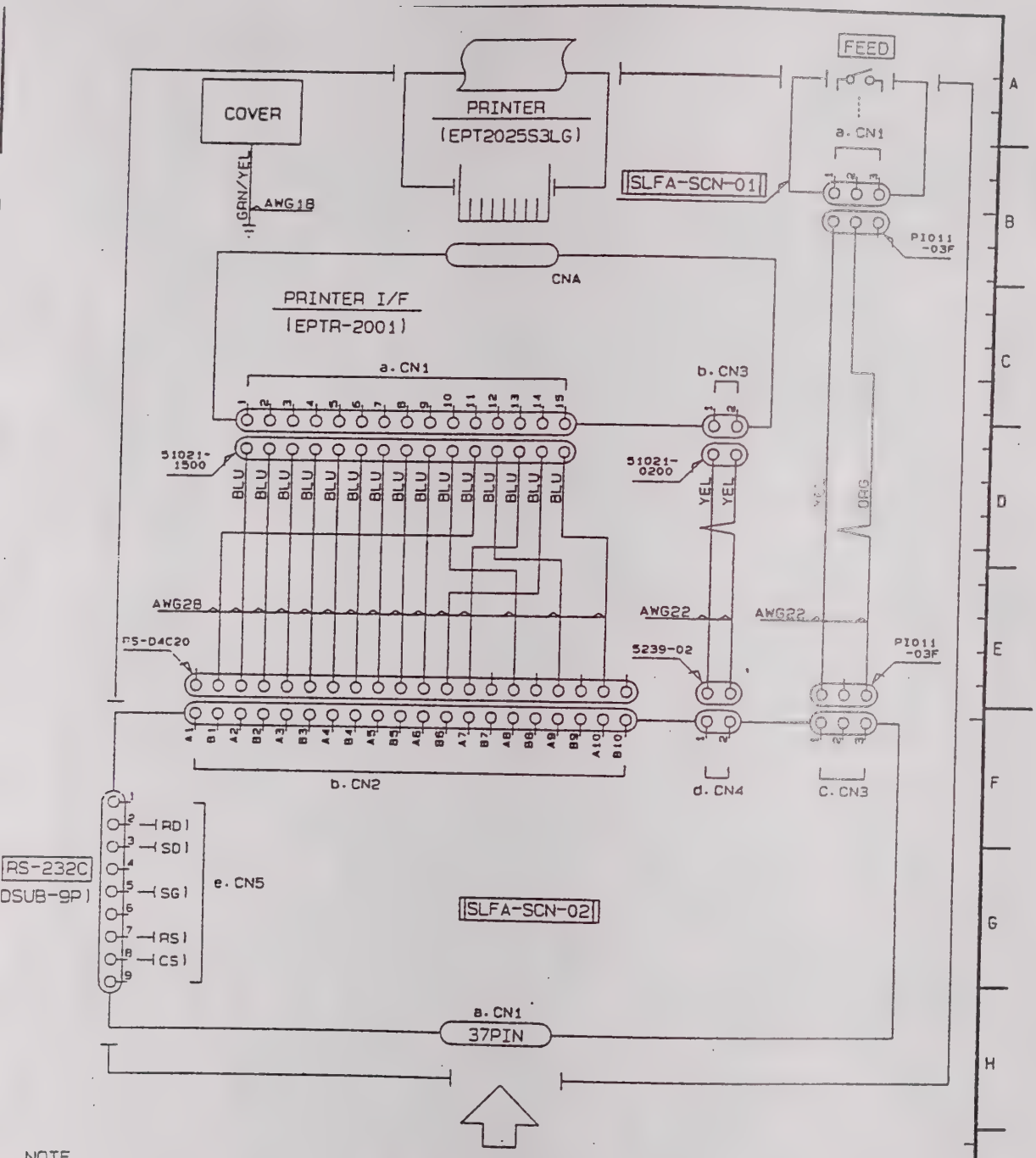

NOTE

1) IN THIS DIAGRAM ⏦ INDICATES TWISTED-PAIR WIRE

NO.	SPEC.	PARTS NO.	NOTES
01			

NAME

SLFA-20
PRINTER UNIT WIRING DIAGRM

REVISED			
7	Changed "WIRING DIAGRAM"	T. Fonatani	1995.Nov.16

DRAWN	CHECKED	APPROVED
T. Fonatani	J. Mori	N. Tsutsumi

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DATE 1995. Nov. 16

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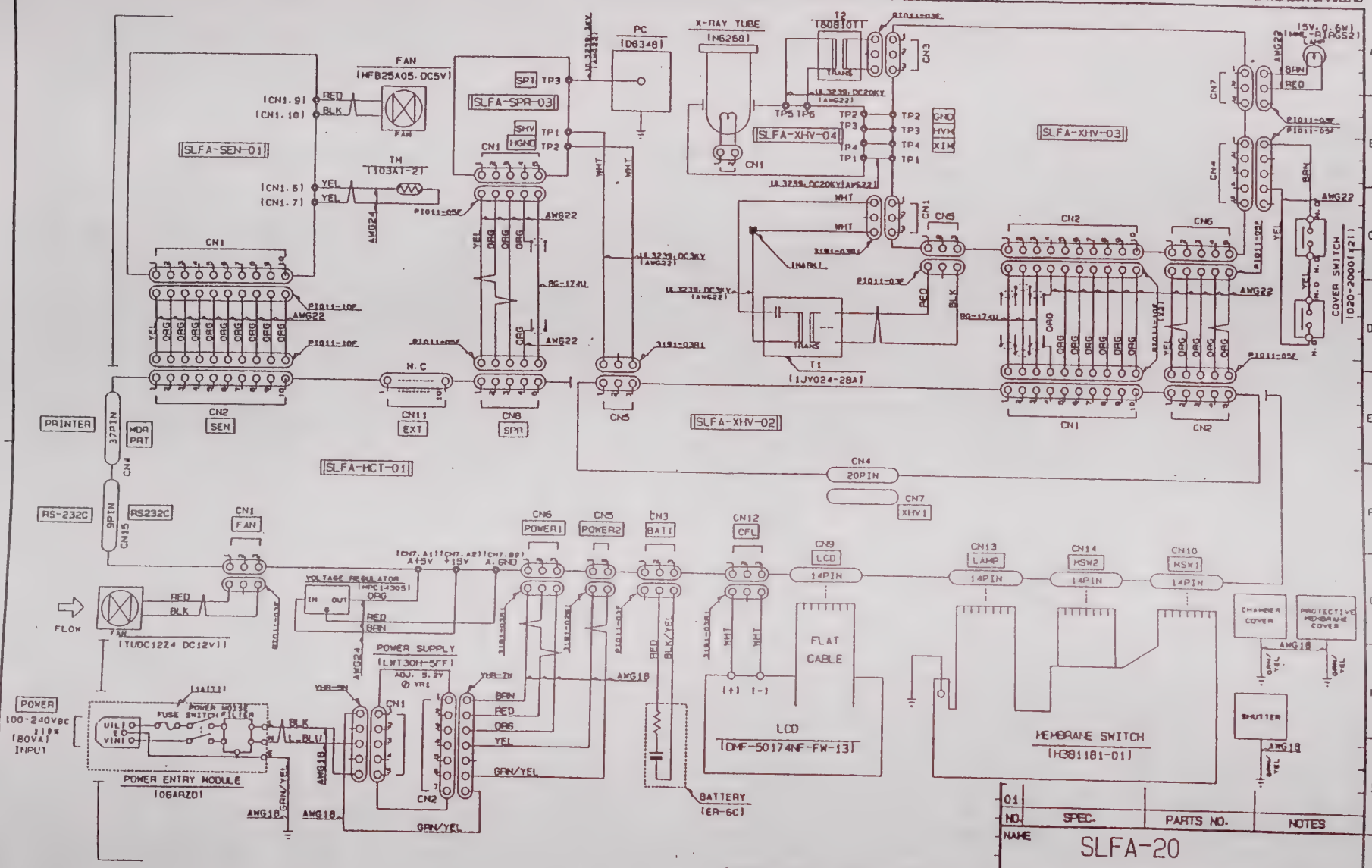


NO.	SPEC.	PARTS NO.	NOTES
01	Changed wire	S.Kandori	1995.Nov.16

REVISED

NAME: SLFA-20

ANALYZER UNIT WIRING DIAGRAM

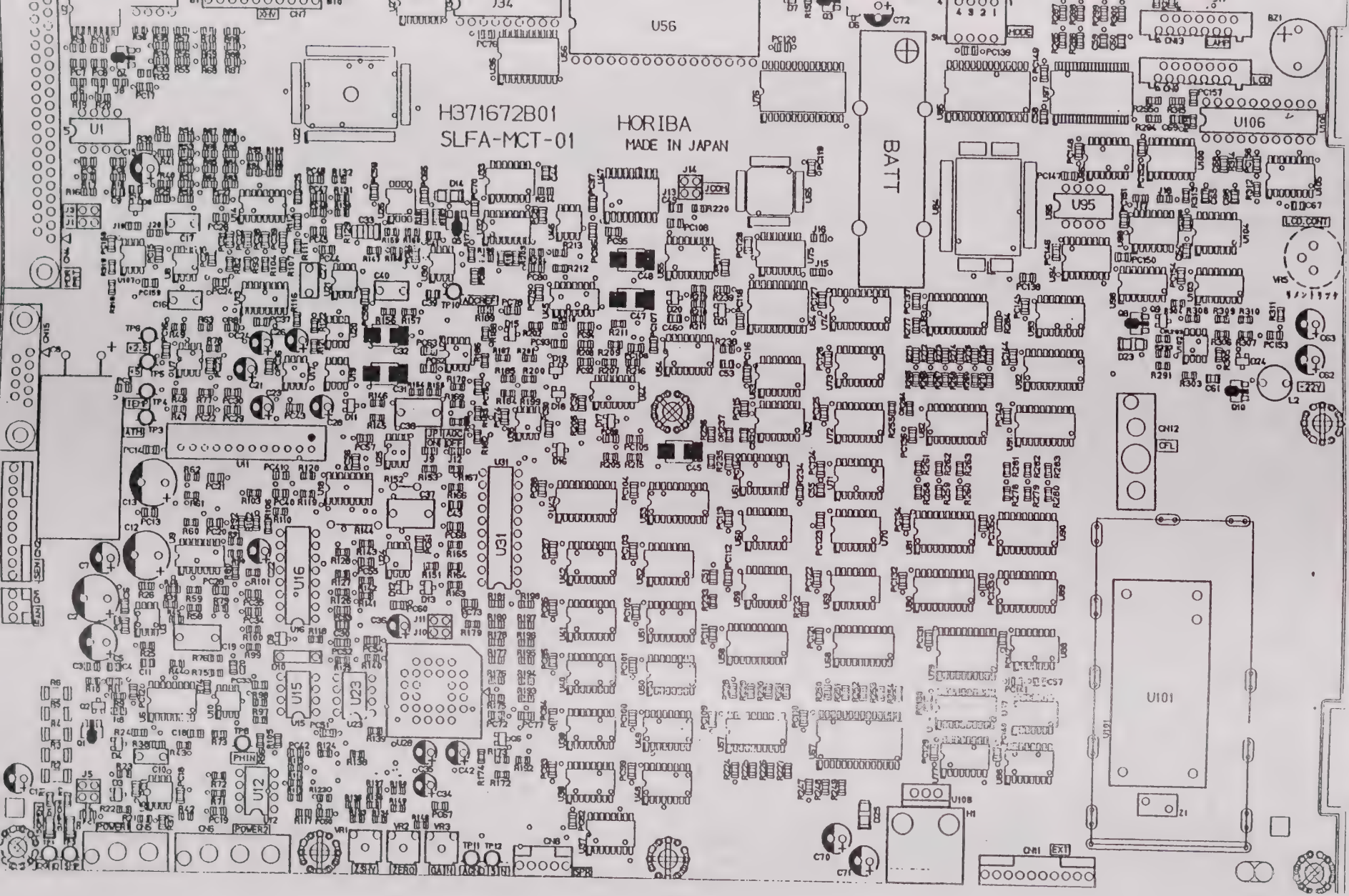
DRAWN	CHECKED	APPROVED
S.Kandori	J.Mori	W.Tsutsumi

SCALE: FREE

DATE: 1995.Nov.16

Z-CAD DRAWING NO. V362842A

HOS HORIBA, Ltd.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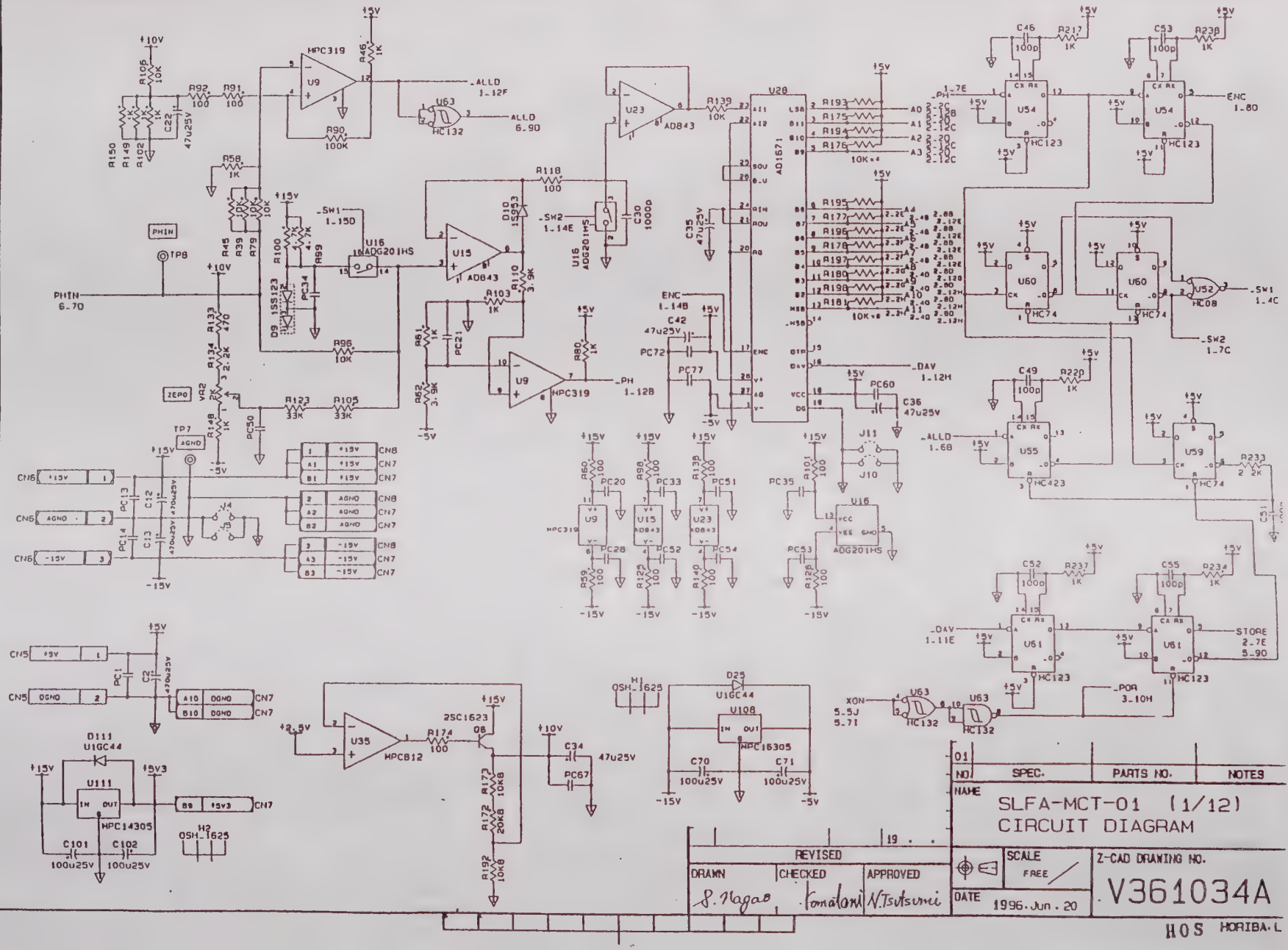


NO	SPEC.	PARTS NO.	NOTES
01			

NAME

SLFA-MCT-01 (1/12)
CIRCUIT DIAGRAM

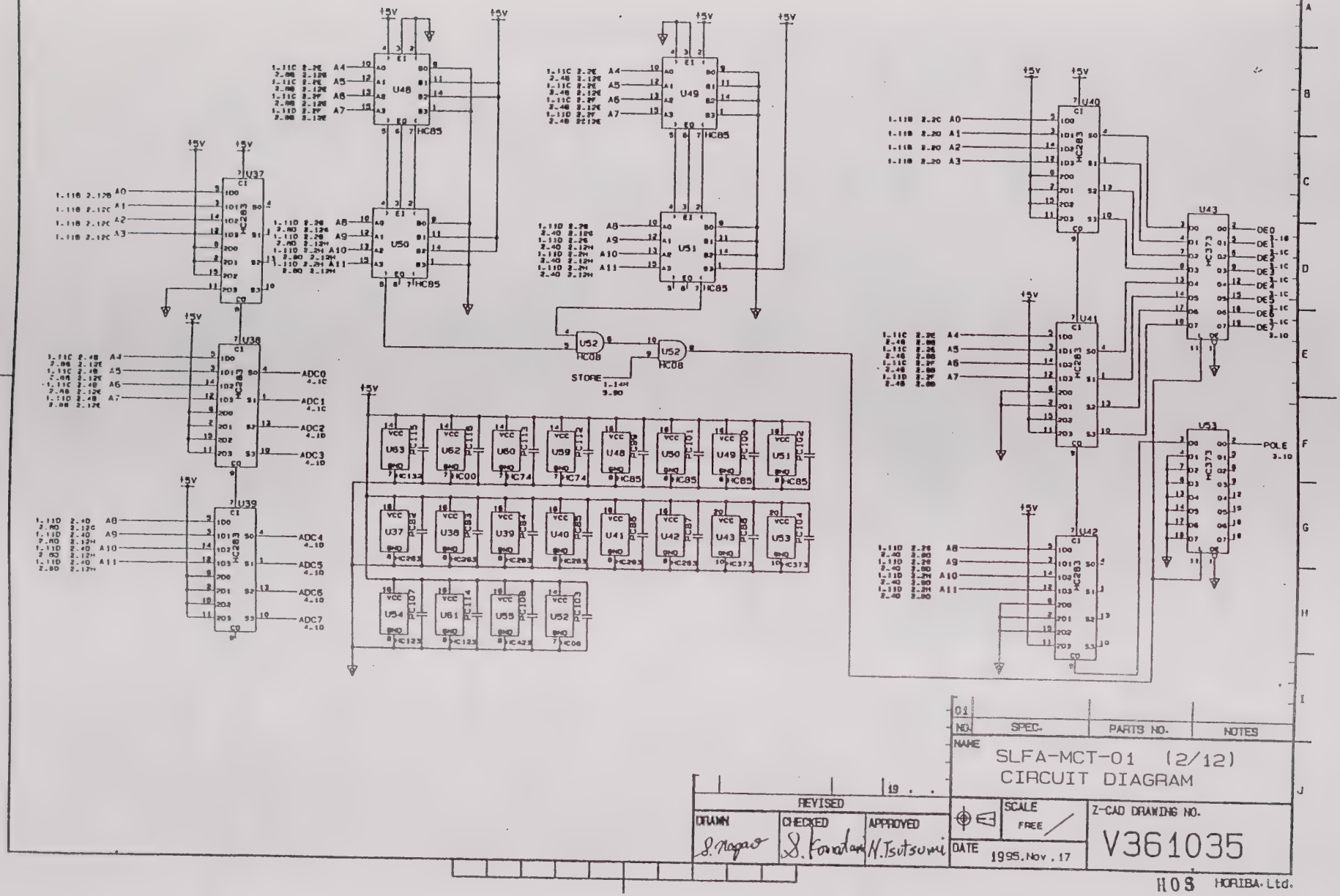
REVISED			19 . .
DRAWN	CHECKED	APPROVED	
S.Nagao	Tomatori	N.Tsutsumi	

SCALE FREE

DATE 1996.Jun.20

Z-CAD DRAWING NO. V361034A

HOS HORIBA.L



NO.	SPEC.	PARTS NO.	NOTES
01			

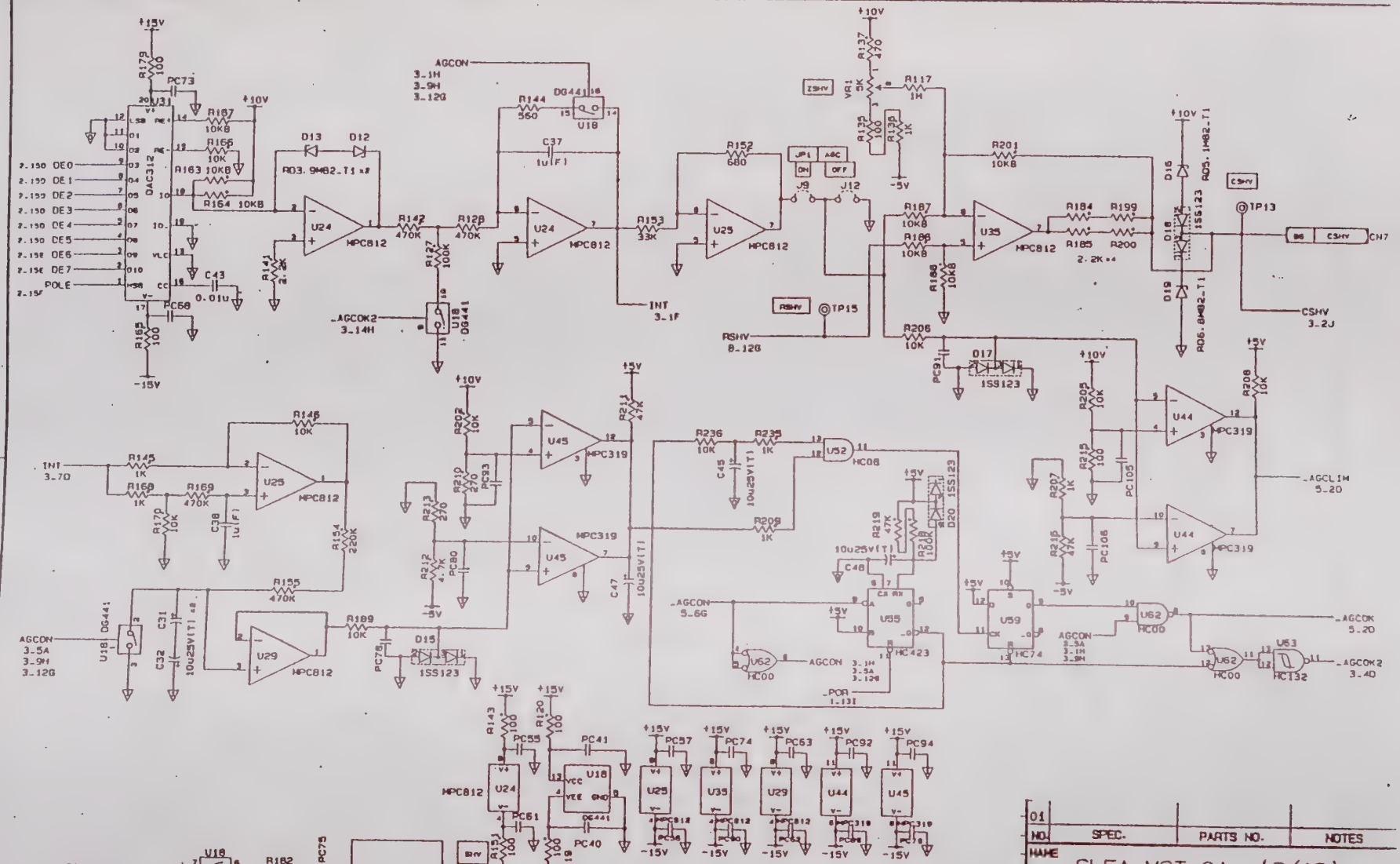
NAME

SLFA-MCT-01 (2/12)
CIRCUIT DIAGRAM

REVISED				
DRAWN	CHECKED	APPROVED	SCALE	Z-CAD DRAWING NO.
S.Nagao	S.Fuwatari	N.Tsutsumi	FREE	V361035
			DATE 1995.Nov.17	

HORIBA, Ltd.

HORIBA
EXTERIOR DRAWI



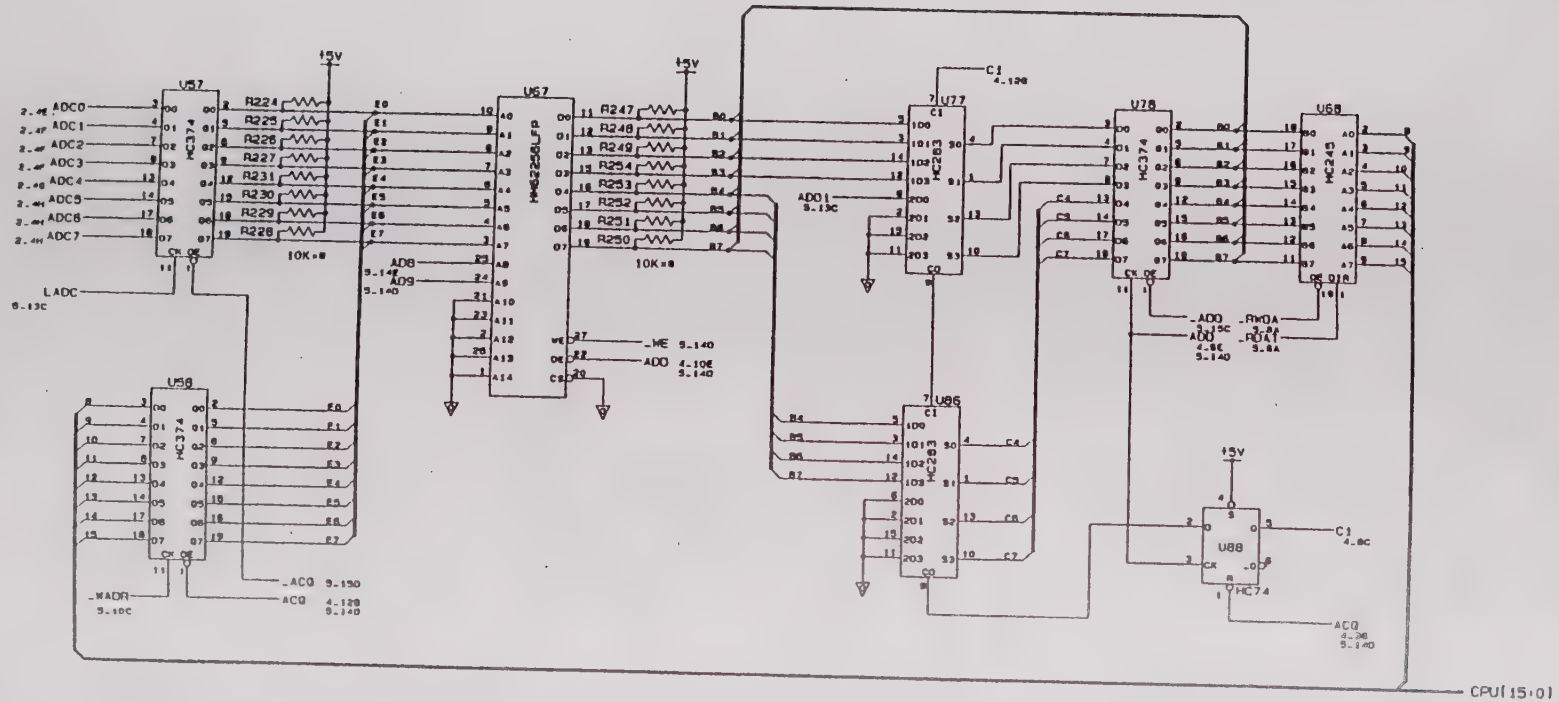
NO.	SPEC.	PARTS NO.	NOTES
01			

NAME: SLFA-MCT-01 (3/12)
CIRCUIT DIAGRAM

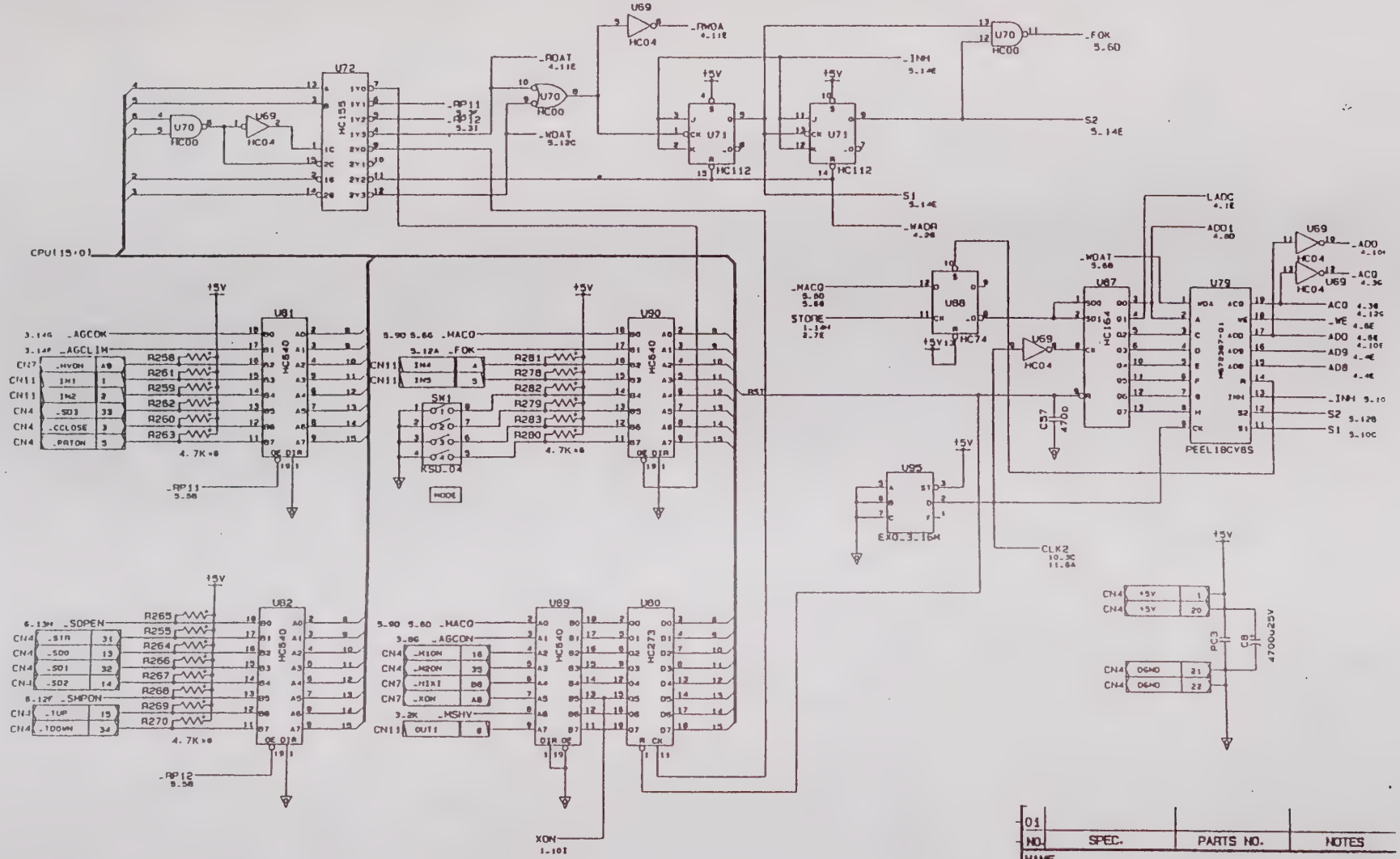
REVISED					
		19 . .			
DRAWN	CHECKED	APPROVED	SCALE	Z-CAD DRAWING NO.	
S.Nagao	S.Fourdagui	N.Tsutsumi	FREE	V361036	
			DATE 1995.Nov.17		

HORIBA, Ltd

V361037


U57
U67
U77
U78
U68
U56
U86
U88
HC374
HC283
HC245
HC74
HM62256LFP
+5V
ADC0
ADC1
ADC2
ADC3
ADC4
ADC5
ADC6
ADC7
R224
R225
R226
R227
R231
R230
R229
R228
R247
R248
R249
R254
R253
R252
R251
R250
10K×8
LADC
ADD1
ADD
_WE
_ACO
ACO
_WADR
_RWDA
_RDAT
CPU[15:0]

HORIBA
EXTERIOR DRAWI

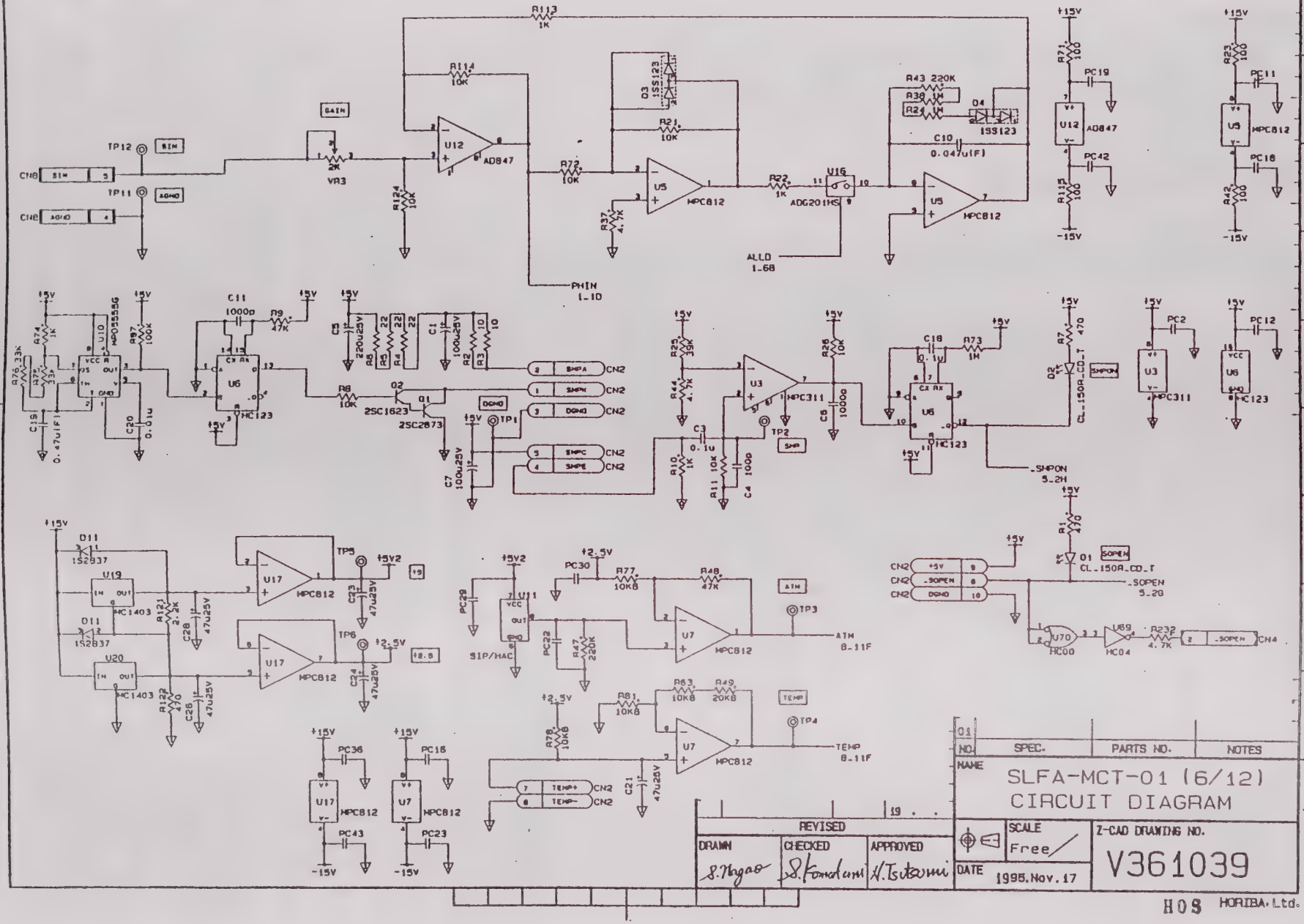


NO.	SPEC.	PARTS NO.	NOTES
01			

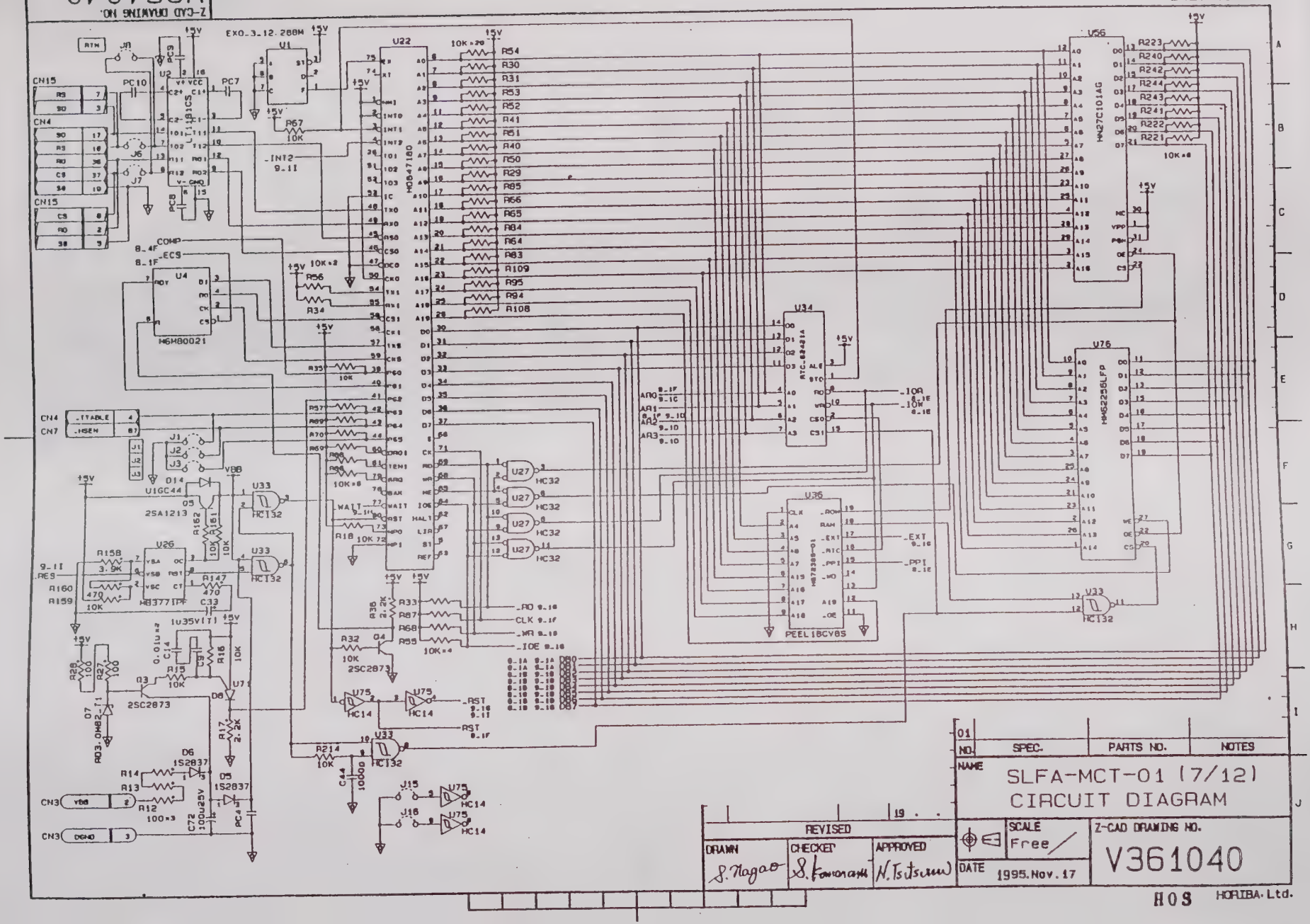
NAME: SLFA-MCT-01 (5/12)
CIRCUIT DIAGRAM

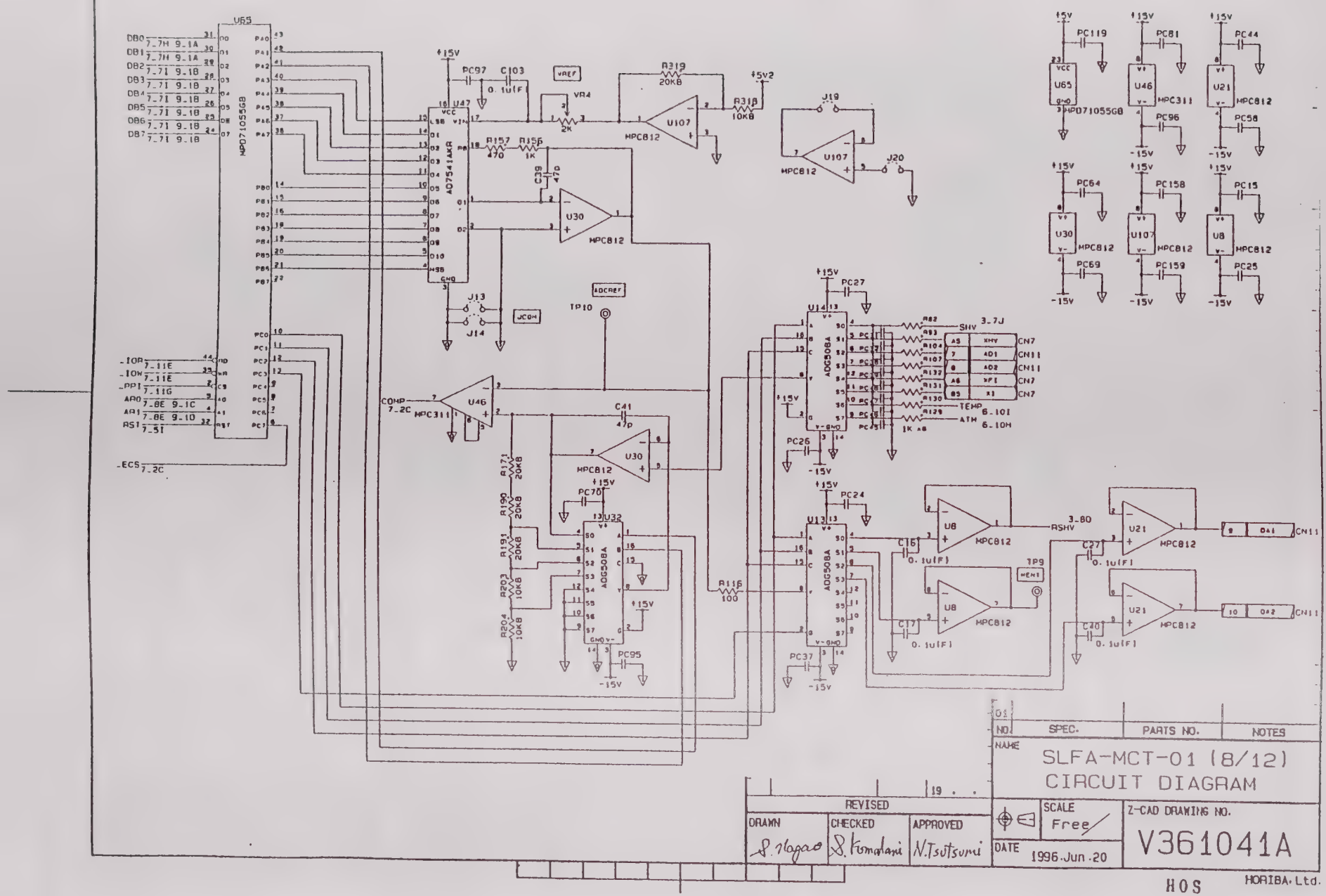
REVISED 19 . .				
DRAWN	C'SD	APPROVED	SCALE FREE	Z-CAD DRAWING NO.
S. Nagao	S. Furukawa	N. Tsutsumi	DATE 1995. Nov. 17	V361038

HORIBA, Ltd


SLFA-MCT-01 (6/12)
CIRCUIT DIAGRAM
NO. SPEC. PARTS NO. NOTES
NAME
REVISED
19 . .
DRAWN S.Nagao
CHECKED S.Kondoni
APPROVED N.Tsutsumi
SCALE Free
DATE 1995.Nov.17
Z-CAD DRAWING NO. V361039
HORIBA, Ltd.
AD847
MPC812
MPC311
MC123
ADG201HS
2SC1623
2SC2873
MC1403
1SS123
CL-150A-CD-T
MC00
MC04
SIN
ADIO
GAIN
PHIN
ALLD
ATM
TEMP
SIP/HAC
SHPON
SOPEN
DGND

V361040
Z-CAD DRAWING NO.





NO.	SPEC.	PARTS NO.	NOTES
03			

NAME: SLFA-MCT-01 (8/12) CIRCUIT DIAGRAM

REVISED			19 . .
DRAWN	CHECKED	APPROVED	
S. Nagao	S. Komatani	N. Tsutsumi	

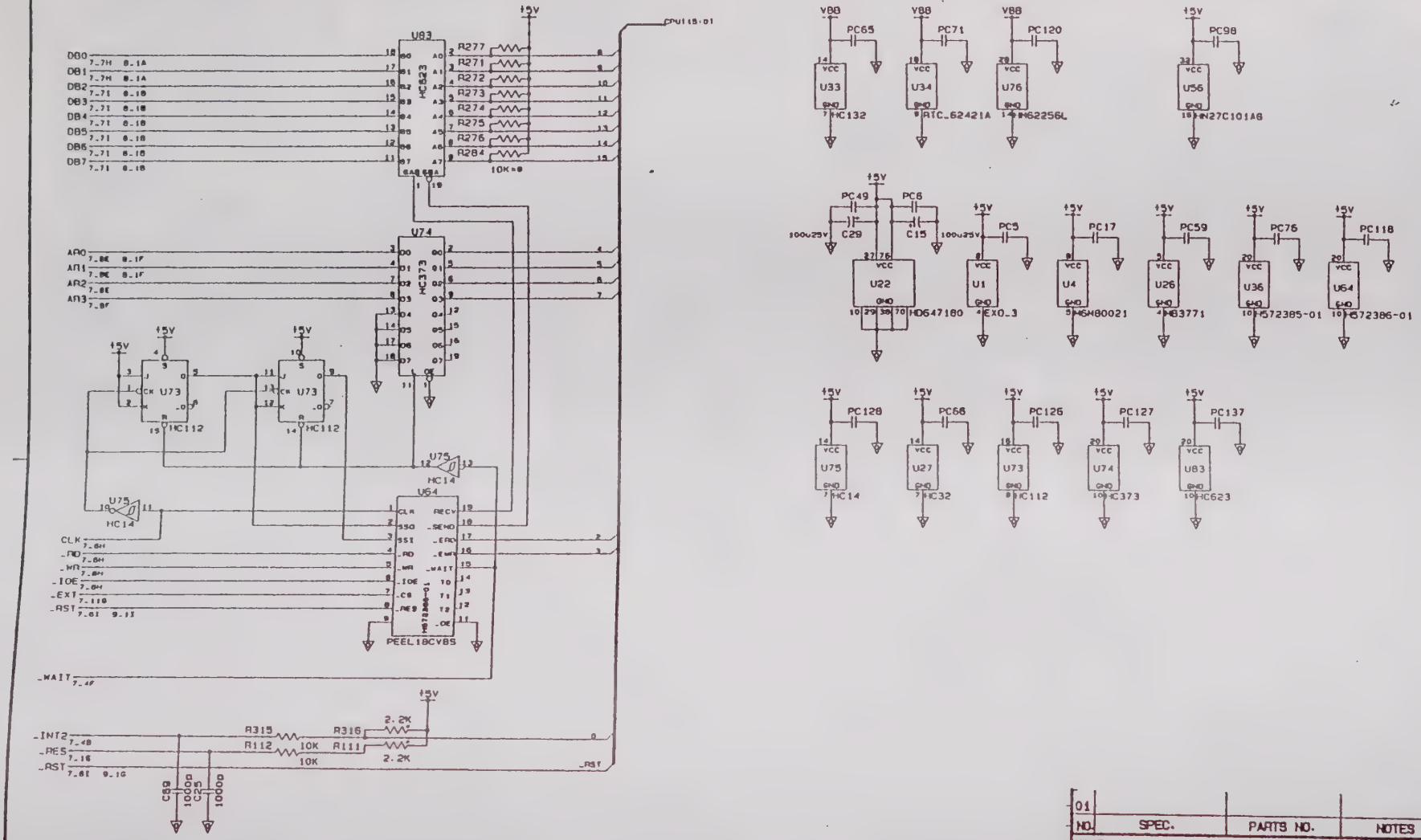
SCALE: Free

DATE: 1996.Jun.20

Z-CAD DRAWING NO.: V361041A

HOS

HORIBA, Ltd.

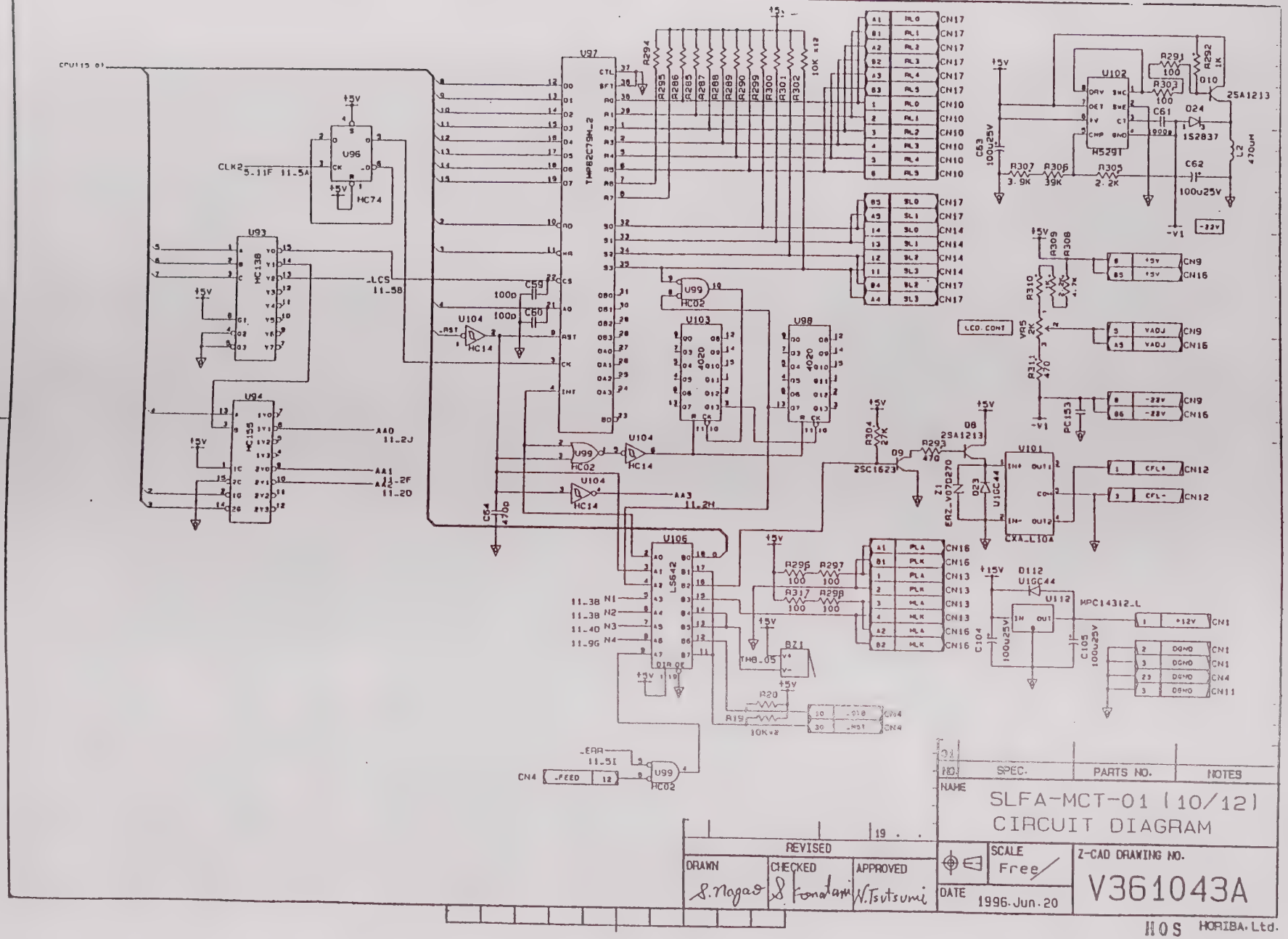


NO.	SPEC.	PARTS NO.	NOTES
01			

NAME: SLFA-MCT-01 (9/12)
CIRCUIT DIAGRAM

REVISED 19 . .		
DRAWN	CHECKED	APPROVED
S.Nagao	S.Kondo	N.Tsutsumi

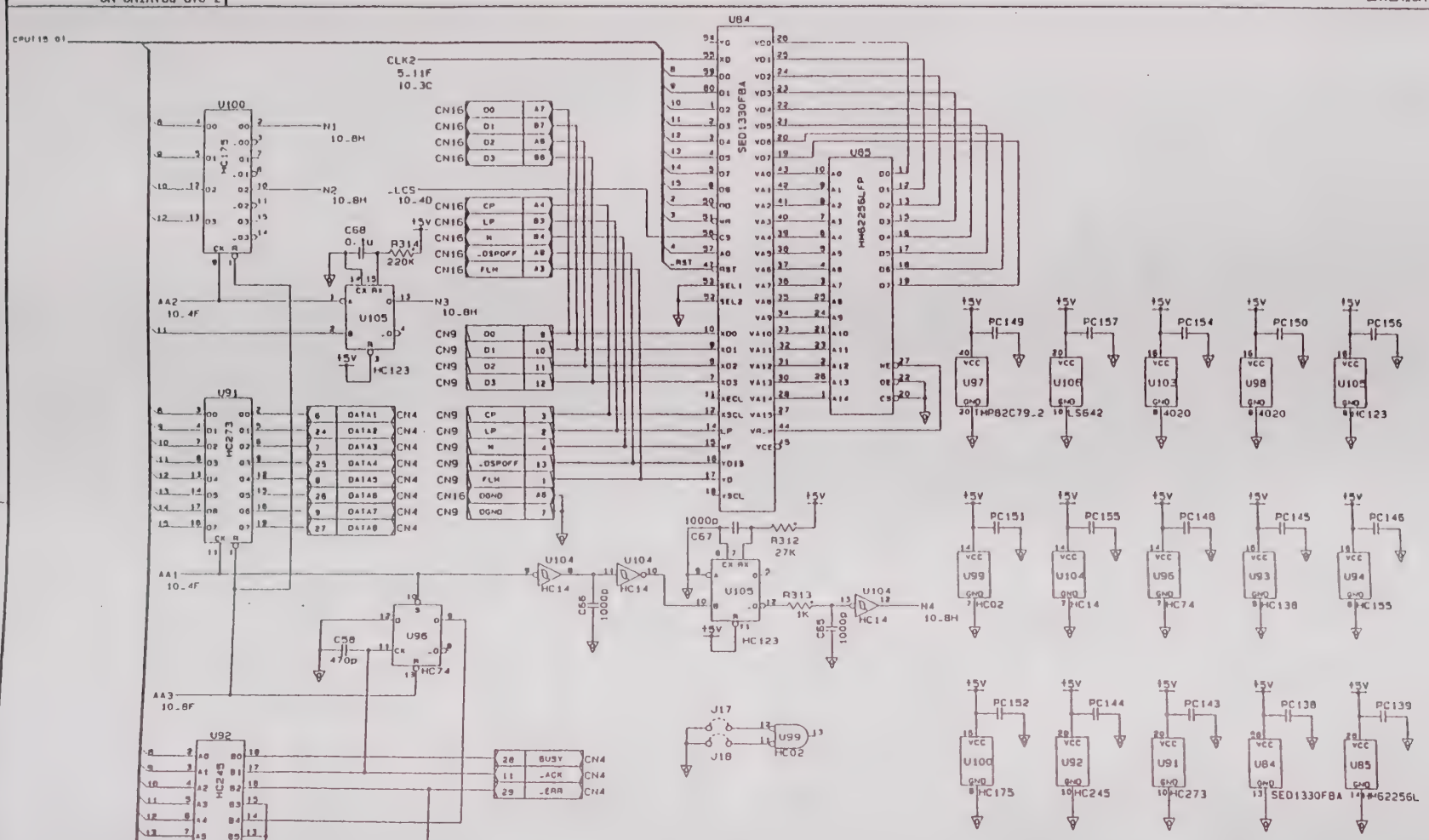
SCALE: Free
DATE: 1995.Nov.17
Z-CAD DRAWING NO.: V361042



NO.	SPEC.	PARTS NO.	NOTES
NAME	SLFA-MCT-01 (10/12) CIRCUIT DIAGRAM		

REVISED				SCALE	Z-CAD DRAWING NO.
19 . .				Free	V361043A
DRAWN	CHECKED	APPROVED	DATE		
S.Nagao	S.Fonatani	W.Tsutsumi	1996.Jun.20		

HORIBA, Ltd.

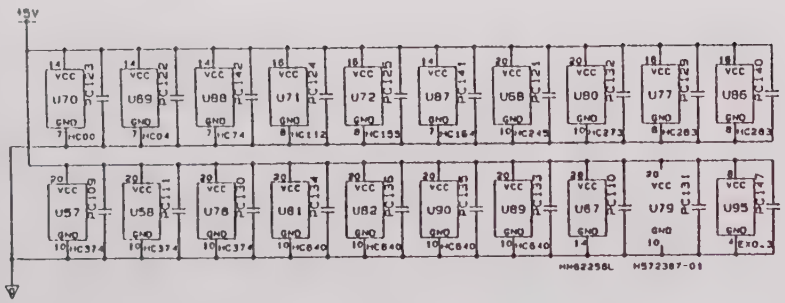


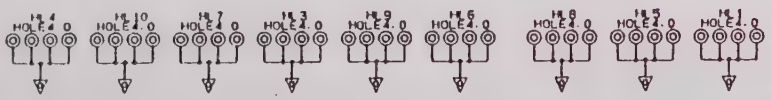
NO.	SPEC.	PARTS NO.	NOTES
01			

NAME

SLFA-MCT-01 (11/12)
CIRCUIT DIAGRAM

REVISED 19 . .			SCALE	Z-CAD DRAWING NO.
DRAWN	CHECKED	APPROVED	Free	V361044A
S.Nagao	r.matsui	N.Tsutsumi	DATE 1996.Jun.20	





SPR

CN8

1	+15V
2	AGND
3	-15V
4	AGND
5	SIN

PI071-05H-5

FAN

CN1

1	+12V
2	DGND
3	DGND

PI071-03H-5

PORT

CN4

1	+5V	20	+5V
2	-BOPEN	21	DGND
3	-CCLOSE	22	DGND
4	-ETABLE	23	DGND
5	-PRTON	24	DATA2
6	DATA1	25	DATA4
7	DATA3	26	DATA6
8	DATA5	27	DATA8
9	DATA7	28	BUSY
10	-STB	29	-ERR
11	-ACK	30	-RST
12	-FEED	31	-STR
13	-SD0	32	-SD1
14	-SD2	33	-SD3
15	-TUP	34	-TDOWN
16	-HION	35	-HZON
17	SO	36	PO
18	RS	37	CS
19	SG		

DCLC-J37SAF-13L9

BATT

CN3

1	
2	VBB
3	DGND

PI071-03M-5

SEN

CN2

1	SMPX
2	SMPA
3	DGND
4	SMPE
5	SMPC
6	TEMP-
7	TEMP+
8	-BOPEN
9	+5V
10	DGND

PI071-10H-5

LCD

CN9

1	FLM
2	LP
3	CP
4	M
5	VADJ
6	+5V
7	DGND
8	-22V
9	D0
10	D1
11	D2
12	D3
13	-DSPOFF
14	

IL-404-14S-TW

XHV1

CN7

A		B
+15V	1	+15V
AGND	2	AGND
-15V	3	-15V
	4	
XHV	5	XI
XFI	6	CSHV
MSHV	7	-MSEN
-AON	8	-MIXI
-HVON	9	+5V3
DGND	10	DGND

PS-20S0-D4TS1-1

CHK1

CN16

A		B
PLA	1	PLK
MLA	2	MLK
FLM	3	LP
CP	4	M
VADJ	5	+5V
DGND	6	-22V
D0	7	D1
D2	8	D3
-DSPOFF	9	
	10	

PS-20S0-D4TS1-1

CHK2

CN17

A		B
PL0	1	PL1
PL2	2	PL3
PL4	3	PL5
SL3	4	SL2
SL1	5	SL0

PS-10S0-D4TS1-1

CFL

CN12

1	CFL+
2	
3	CFL-

S219-03A

RS232C

CN15

1		6	
2	RD	7	RS
3	SD	8	CS
4		9	
5	SG		

DELC-J9PAF-20L9

POWER1

CN5

1	+5V
2	DGND

S219-02A

POWER2

CN6

1	+15V
2	AGND
3	-15V

S219-03A

EXT

CN11

1	IN1
2	IN2
3	DGND
4	IN4
5	IN5
6	OUT1
7	AD1
8	AD2
9	DA1
10	DA2

PI071-10H-5

MSW1

CN10

1	PL0
2	PL1
3	PL2
4	PL3
5	PL4
6	PL5
7	
8	
9	
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12	
13	
14	

IL-404-14S-TW

MSW2

CN14

1	
2	
3	
4	
5	
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7	
8	
9	
10	
11	SL3
12	SL2
13	SL1
14	SL0

IL-404-14S-TW

LAMP

CN13

1	PLA
2	PLK
3	MLA
4	MLK
5	
6	
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14	

IL-404-14S-TW

NO.	SPEC.	PARTS NO.	NOTES
01			

NAME SLFA-MCT-01 (12/12)
CIRCUIT DIAGRAM

19 . .
REVISED

DRAWN	CHECKED	APPROVED
S.Togao	S.Komatsu	N.Tsutsumi

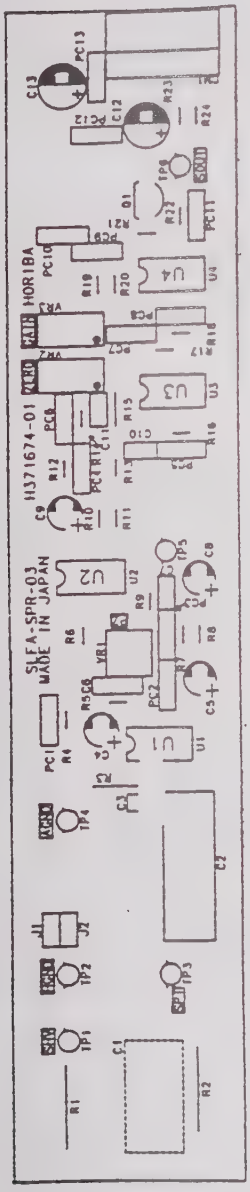
SCALE FREE

DATE 1996.Jun.20

Z-CAD DRAWING NO. V361045A

HOS HORIBA,Ltd

SLFA-SPR-03


SLFA-SPR-03
MADE IN JAPAN
HORIBA
U1
U2
U3
U4
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
R1
R2
R3
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PC9
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PC11
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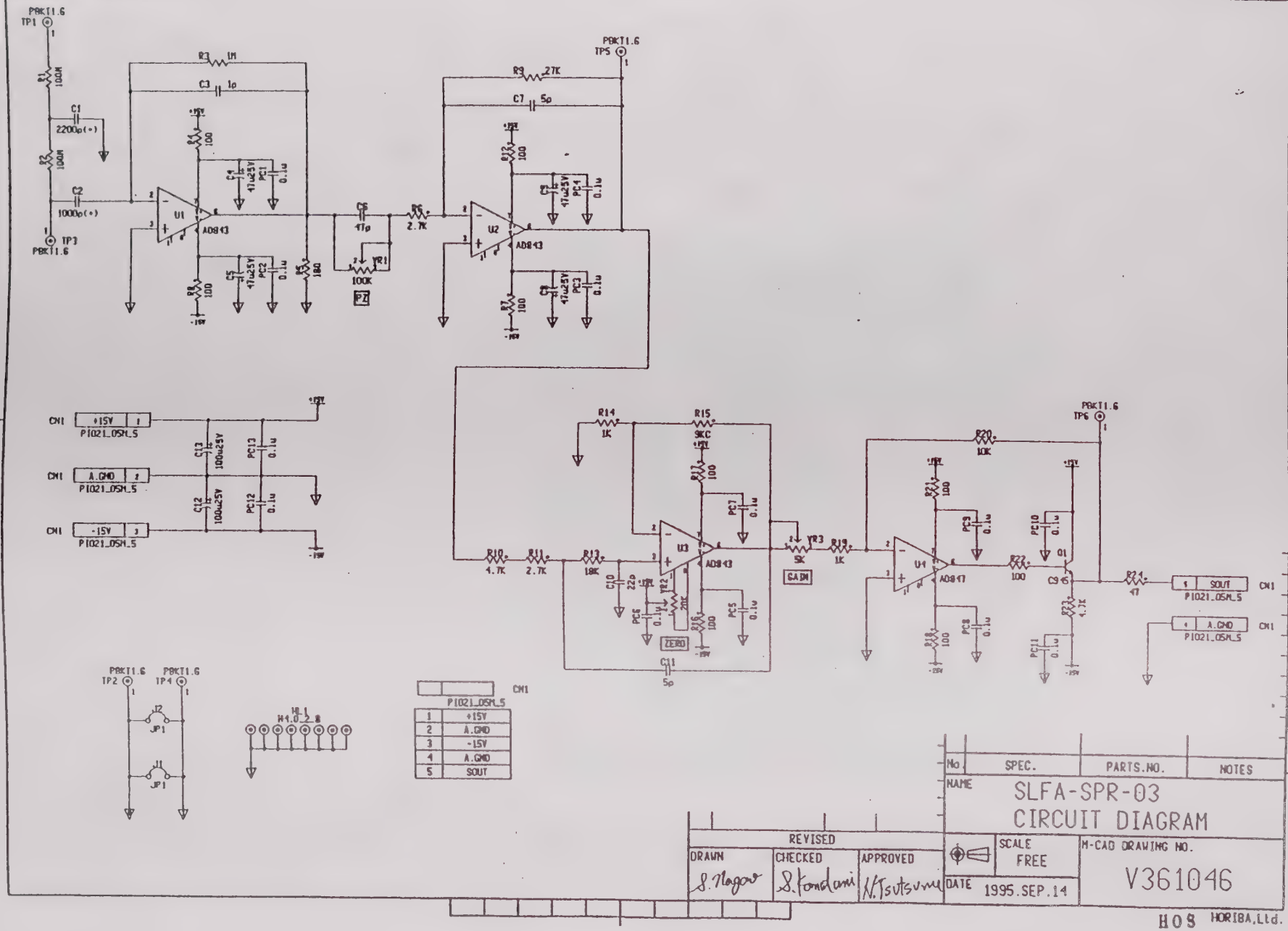
J1
J2
D1
Z1
Z2

EXTERIOR DRAWING

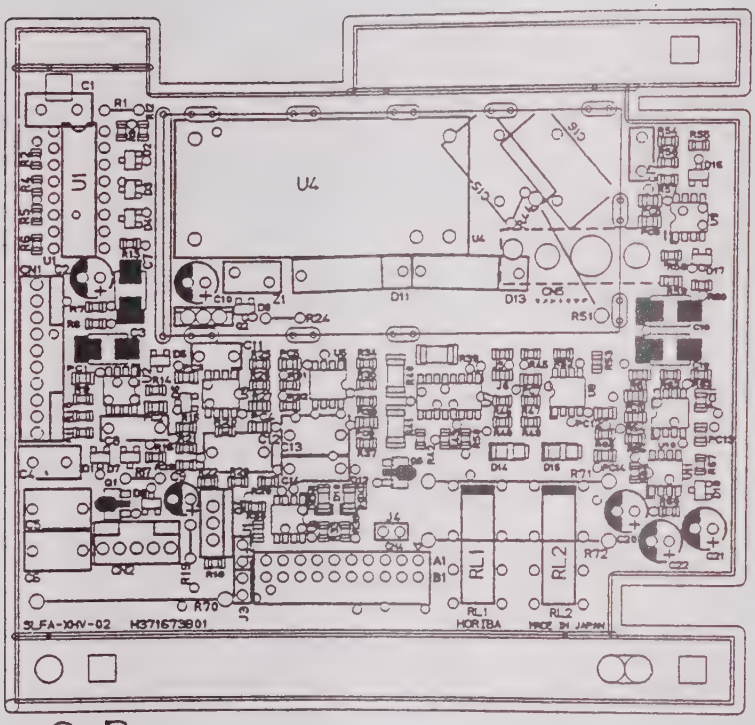


No	SPEC.	PARTS.NO.	NOTES
NAME	SLFA-SPR-03 CIRCUIT DIAGRAM		

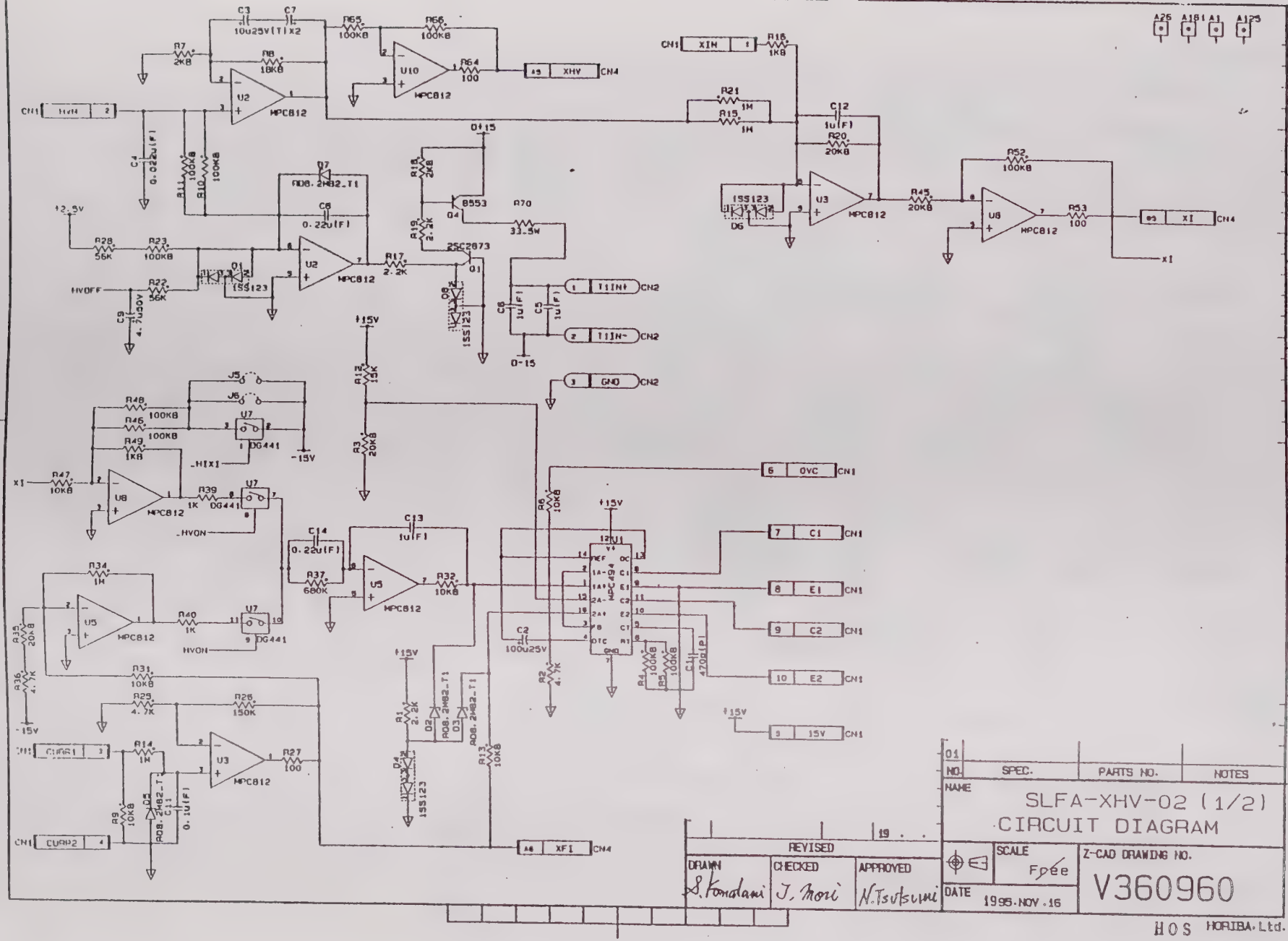
REVISED				
DRAWN	CHECKED	APPROVED	SCALE	M-CAD DRAWING NO.
S.Nagao	S.Tondani	N.Tsutsumi	FREE	V361046
			DATE 1995.SEP.14	

HOS HORIBA,Ltd.

SLFA-XHV-02

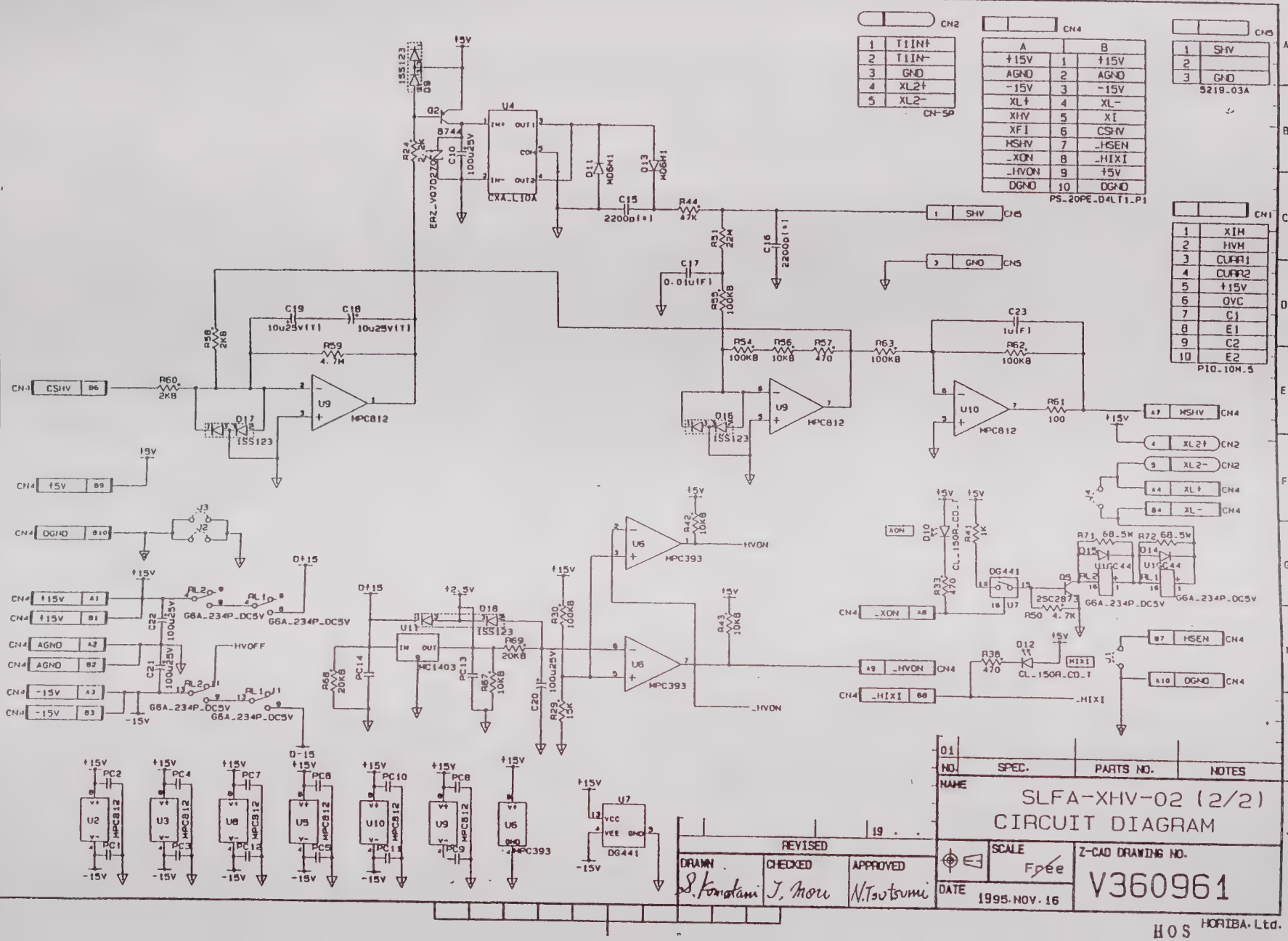


C-B


A25 A181 A1 A125
CN1 XIN 1
R16 1KΩ
R21 1M
R15 1M
C12 1u(F)
R20 20KΩ
U3 MPC812
ISS123
D6
R45 20KΩ
R52 100KΩ
U8 MPC812
R53 100
CN4 XI
XI
C3 C7 10u25V(T)x2
R65 100KΩ
R66 100KΩ
U10 MPC812
R64 100
CN4 XHV
R7 2KΩ
R8 18KΩ
U2 MPC812
CN1 HVM 2
C4 0.022u(F)
R11 100KΩ
R10 100KΩ
D7 RD6.2HB2-T1
C6 0.22u(F)
+2.5V
R28 56K
R23 100KΩ
HVOFF
R22 56K
C9 4.7u50V
Q1 ISS123
U2 MPC812
D4 15
R18 2KΩ
8553
Q4
R19 2.2K
R70 33.3K
25C2873
Q1
R17 2.2K
D8 ISS123
C8 1u(F)
C5 1u(F)
T1IN+ CN2
T1IN- CN2
0-15
+15V
R12 15K
R3 20KΩ
GND CN2
U5 U6 U7 DG441
R48 100KΩ
R46 100KΩ
R49 1KΩ
-15V
-HIX1
X1
R47 10KΩ
U8 MPC812
R39 1K
DG441
U7
-HVON
C14 0.22u(F)
C13 1u(F)
R37 680K
U5 MPC812
R32 10KΩ
12V1
R6 10KΩ
+15V
6 OVC CN1
7 C1 CN1
8 E1 CN1
9 C2 CN1
10 E2 CN1
3 15V CN1
C2 100u25V
R2 4.7K
R4 100KΩ
R5 100KΩ
C11 4700(P)
R34 1M
R35 20KΩ
U5 MPC812
R40 1K
U7
HVON
R36 4.7K
-15V
R31 10KΩ
R29 4.7K
R26 150K
CN1 CURR1 3
R14 1M
U3 MPC812
R27 100
R9 10KΩ
D5 RD6.2HB2-T1
C11 0.1u(F)
CN1 CURR2 4
R1 2.2K
D2 RD6.2HB2-T1
D3
D4 ISS123
R13 10KΩ
XFI CN4
NO. SPEC. PARTS NO. NOTES
NAME
SLFA-XHV-02 (1/2)
CIRCUIT DIAGRAM
REVISED 19 . .
DRAWN S. Kondani
CHECKED J. Mori
APPROVED N. Tsutsumi
SCALE Free
DATE 1995-NOV-16
Z-CAD DRAWING NO.
V360960
HOS HORIBA, Ltd.

HORIBA

EXTERIOR DRAWING



NO.	SPEC.	PARTS NO.	NOTES
01			

NAME: SLFA-XHV-02 (2/2) CIRCUIT DIAGRAM

REVISED			19 . .
DRAWN	CHECKED	APPROVED	
S. Kondani	J. Mori	N. Tsutsumi	

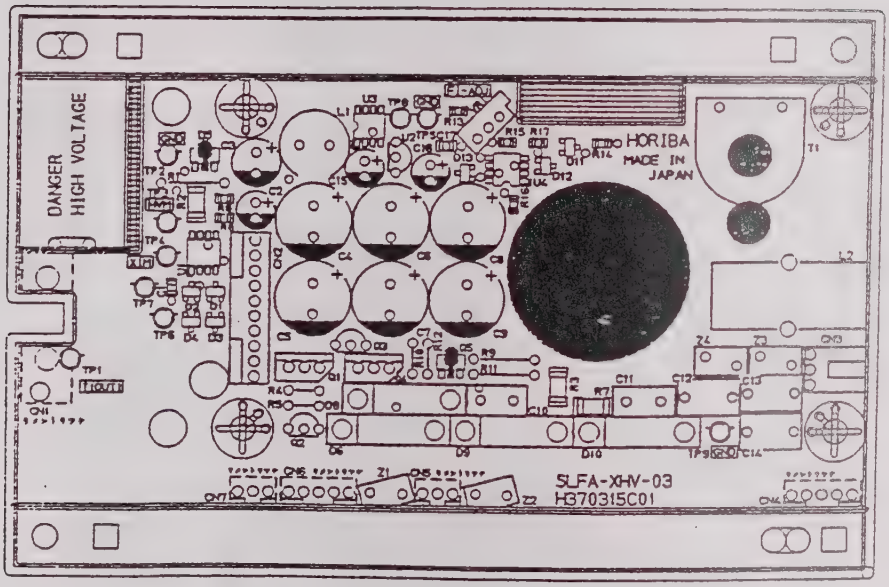
SCALE: Free

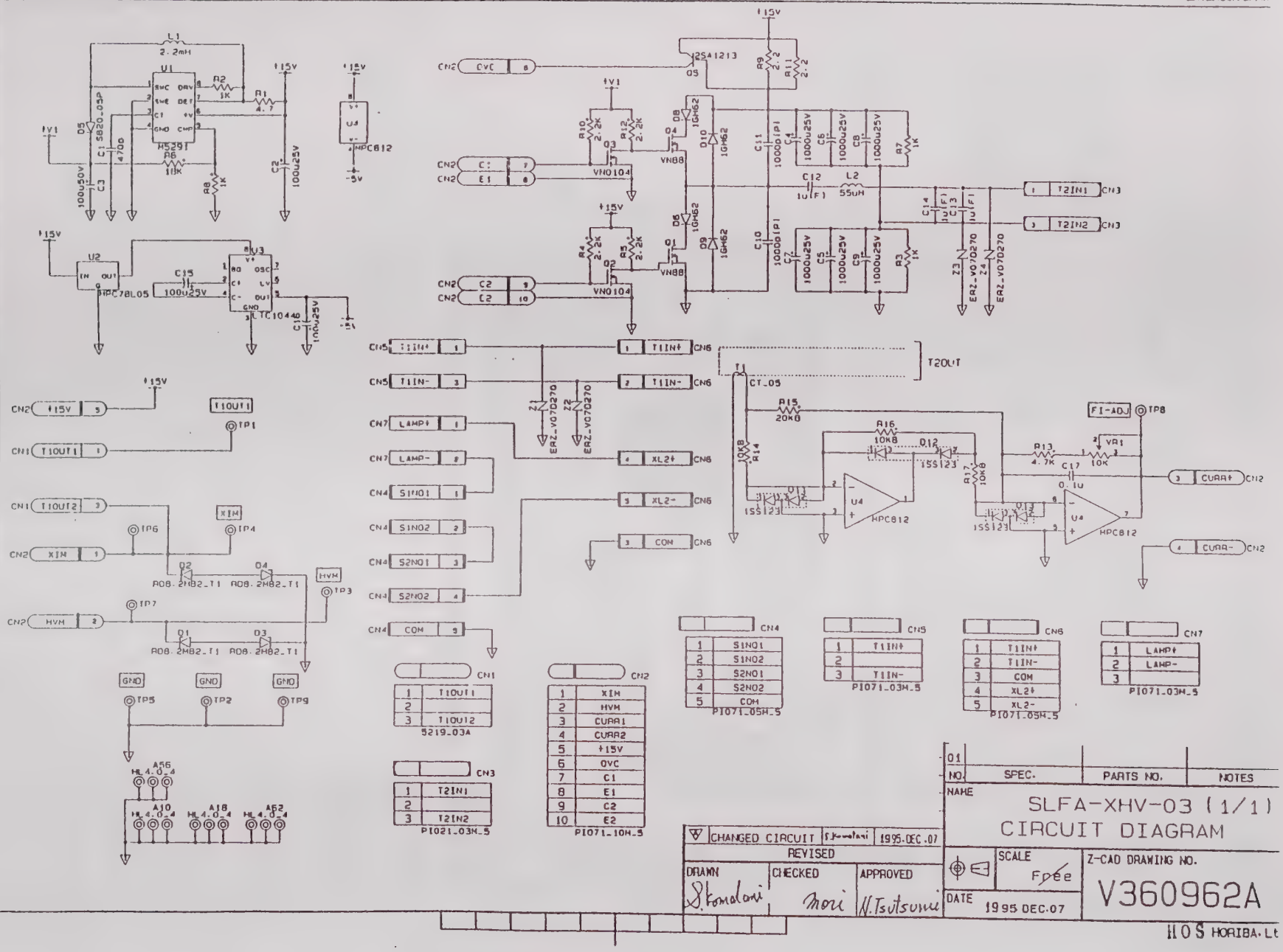
DATE: 1995. NOV. 16

Z-CAD DRAWING NO. V360961

HORIBA, Ltd.

SLFA-XHV-03


DANGER
HIGH VOLTAGE
HORIBA
MADE IN
JAPAN
SLFA-XHV-03
HG70315C01



NO.	SPEC.	PARTS NO.	NOTES
01			

NAME

SLFA-XHV-03 (1/1)
CIRCUIT DIAGRAM

CHANGED CIRCUIT	S.Konodani	1995.DEC.07
REVISED		

DRAWN	CHECKED	APPROVED
S.Konodani	Mori	N.Isutsumi

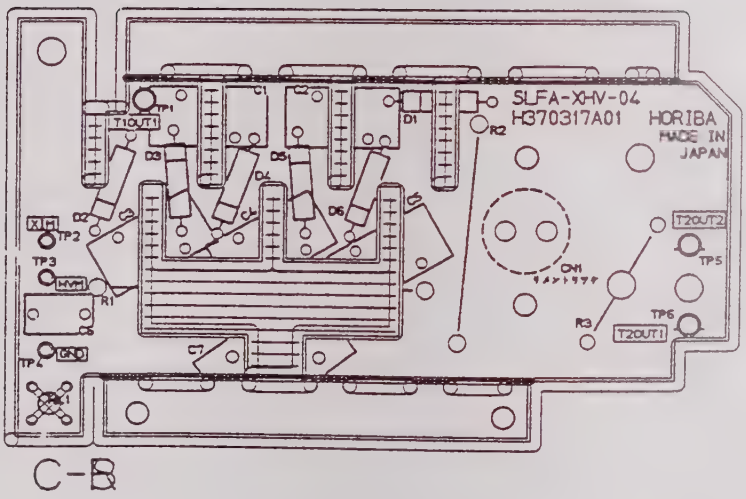
SCALE Free

DATE 1995 DEC.07

Z-CAD DRAWING NO. V360962A

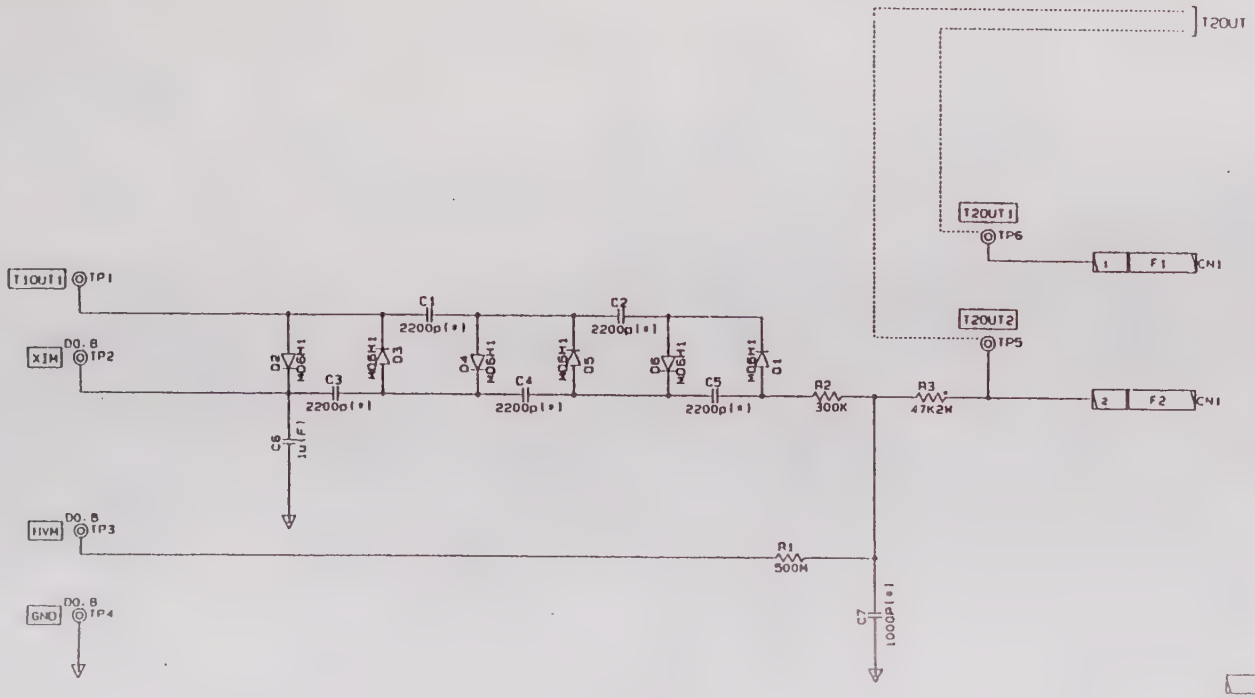
HORIBA, Ltd

SLFA-XHV-04


SLFA-XHV-04
H370317A01
HORIBA
MADE IN
JAPAN
T1OUT1
T2OUT2
T2OUT1
TP1
TP2
TP3
TP4
TP5
TP6
R1
R2
R3
C1
C2
C3
C4
C5
C6
C7
D1
D2
D3
D4
D5
D6
D7
CN1
C-B

V360963
Z-CAD DRAWING NO.

HORIBA
EXTERIOR DRAWING



NO.	SPEC.	PARTS NO.	NOTES
01			

NAME: SLFA-XHV-04 (1/1)
CIRCUIT DIAGRAM

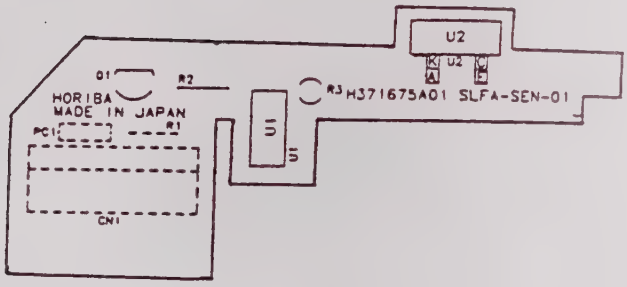
REVISED	19 . .

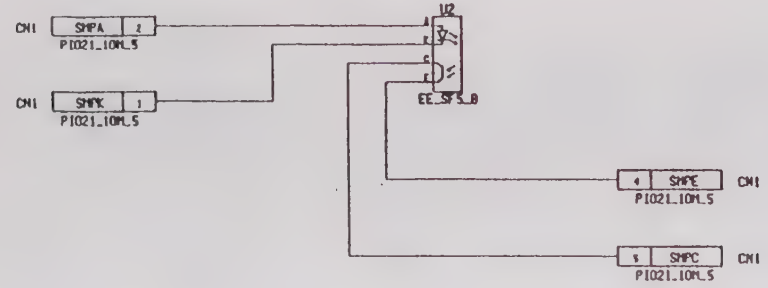
DRAWN	CHECKED	APPROVED	SCALE	Z-CAD DRAWING NO.
S.Kondani	J.Mori	N.Tsutsumi	FREE	V360963

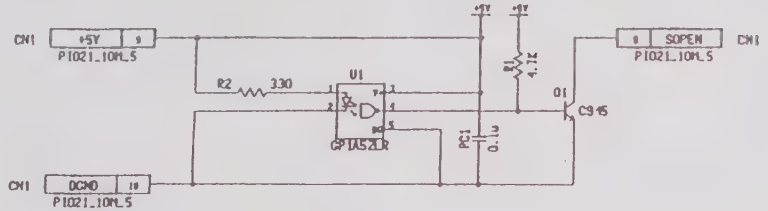
DATE 1995. NOV. 14

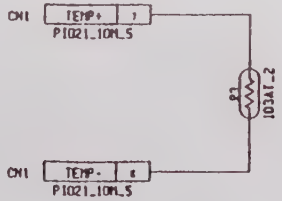
HOS HORIBA, Ltd.

SLFA–SEN–01 circuit board
markings









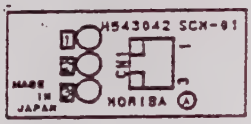
CN1
P1021-10M-S

1	SMPX
2	SMPA
3	
4	SMPE
5	SMPC
6	TEMP-
7	TEMP+
8	SOPEN
9	+5V
10	DGND

No	SPEC.	PARTS.NO.	NOTES
NAME	SLFA-SEN-01 CIRCUIT DIAGRAM		

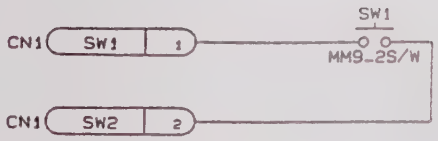
REVISED			SCALE	M-CAD DRAWING NO.
DRAWN	CHED	APPROVED	FREE	V361047
S. Nagao	S. Fondani	N. Tsutsumi	DATE 1995.SEP.14	

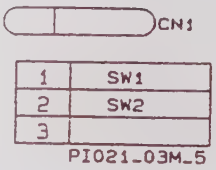
SCN–01 circuit board
(Used with printer feed switch on SLFA–20)
markings



Z-CAD DRAWING NO.

EXTERIOR DRAWING





NO.	SPEC.	PARTS NO.	NOTES
01			

NAME

SLFA-SCN-01
CIRCUIT DIAGRAM

REVISED 19 . .

DRAWN	CHECKED	APPROVED
S.Nagao	S.Fonahashi	N.Tsutsumi

SCALE FREE

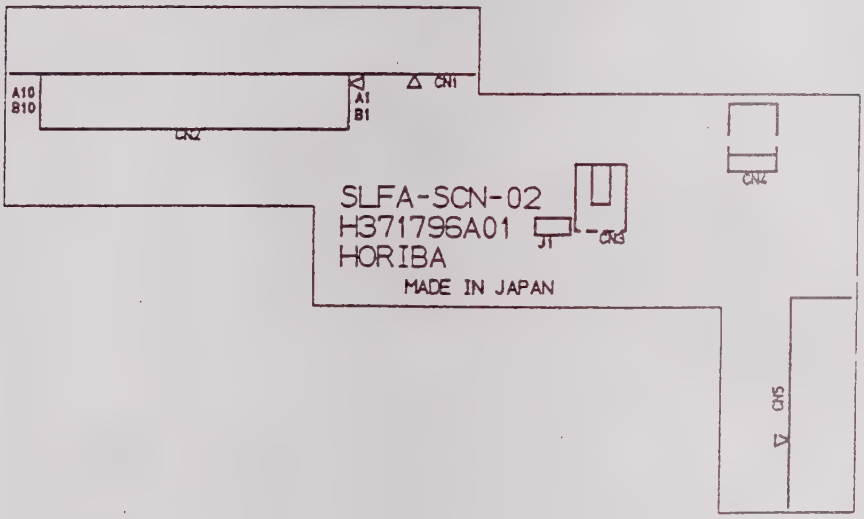
DATE 19 . .

Z-CAD DRAWING NO.

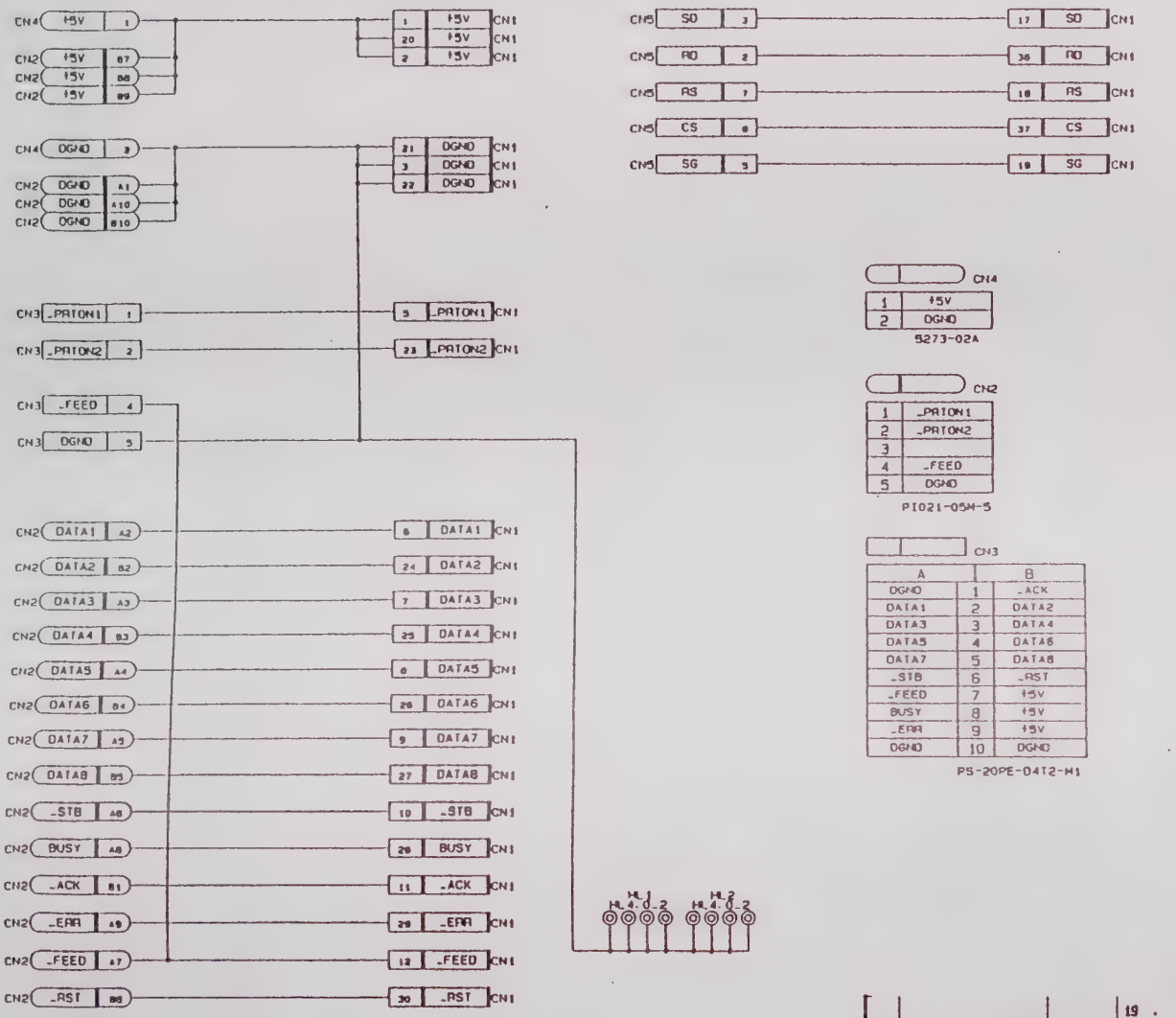
V434130

HOS HORIBA, Ltd.

SLFA-SCN-02 circuit board
markings



HORIBA
EXTERIOR DRAWING



NO.	SPEC.	PARTS NO.	NOTES
01			

NAME: SLFA-SCN-02 CIRCUIT DIAGRAM

REVISED	19 . .
DRAWN	CHECKED / APPROVED
S. Naga	S. Fondam / N. Tsukuma

SCALE: Free
DATE: 1995. Aug. 11
Z-CAD DRAWING NO.: V361048

HOS HORIBA, LTD.

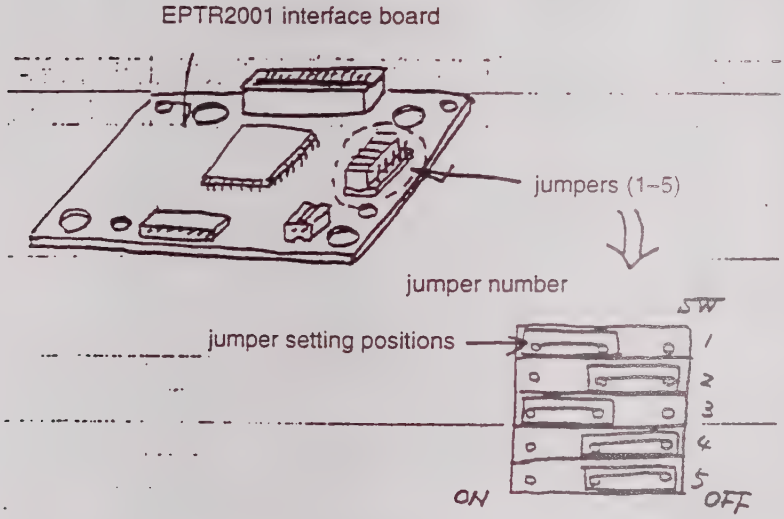
● Printer Interface Board Setup

The following shows how to setup the jumpers on the printer interface board (EO12953300:EPTR2001) used in the SLFA–20 tester.

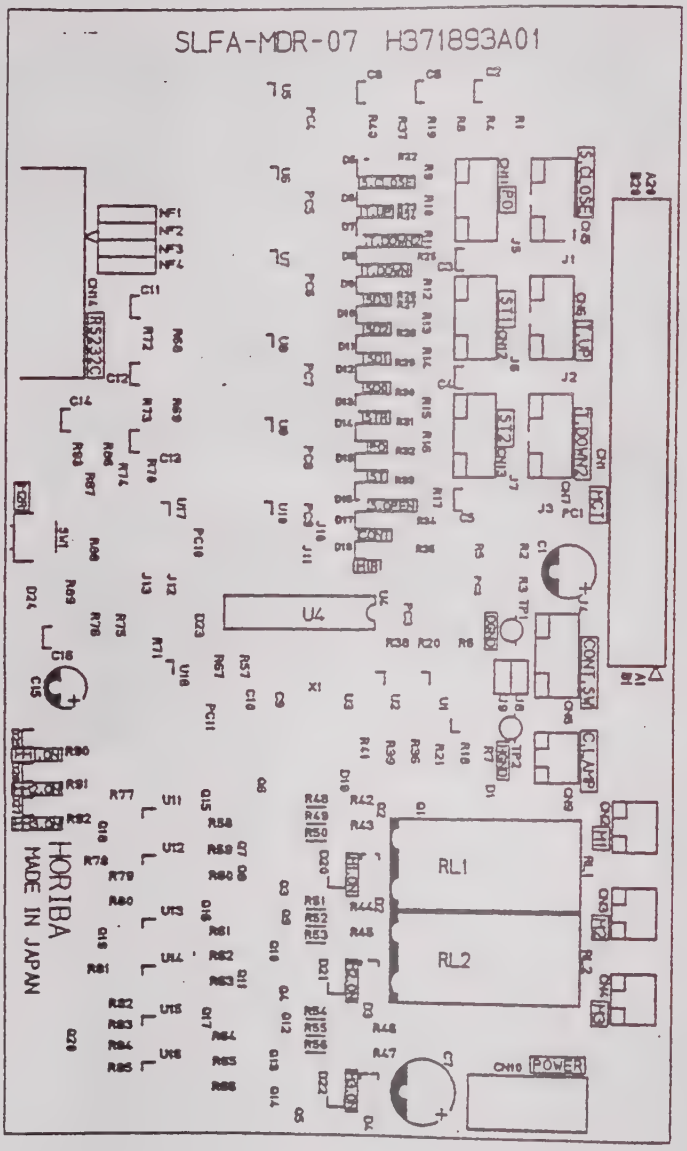
Jumper Setting

Set the jumpers on the EPTR2001 printer interface board as shown in the diagram below.

Note▸▸▸ Be sure to set the jumpers before connecting the printer.



SLFA-MDR-07

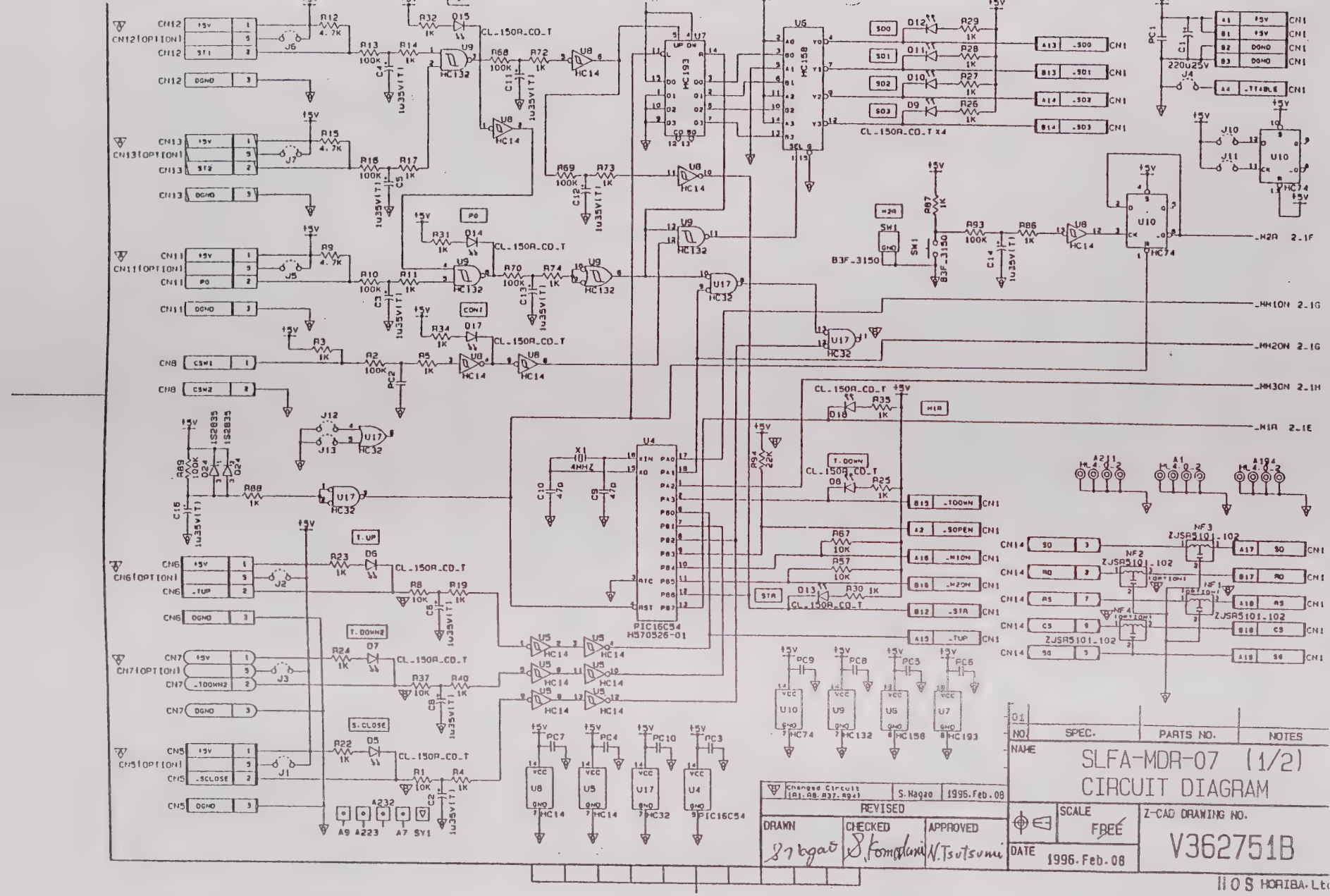


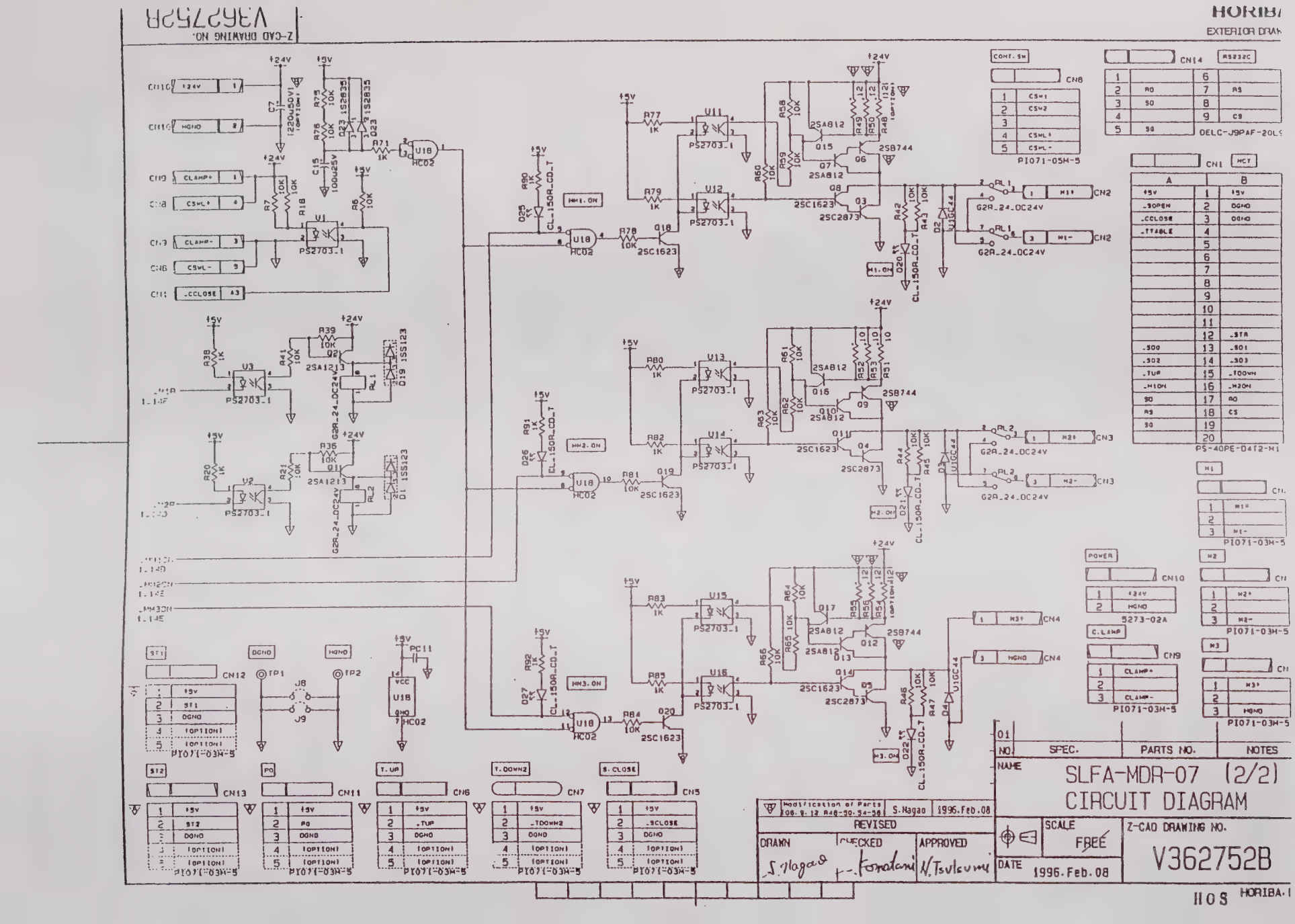
参考図面	図面番号
	Z847080 78 2/

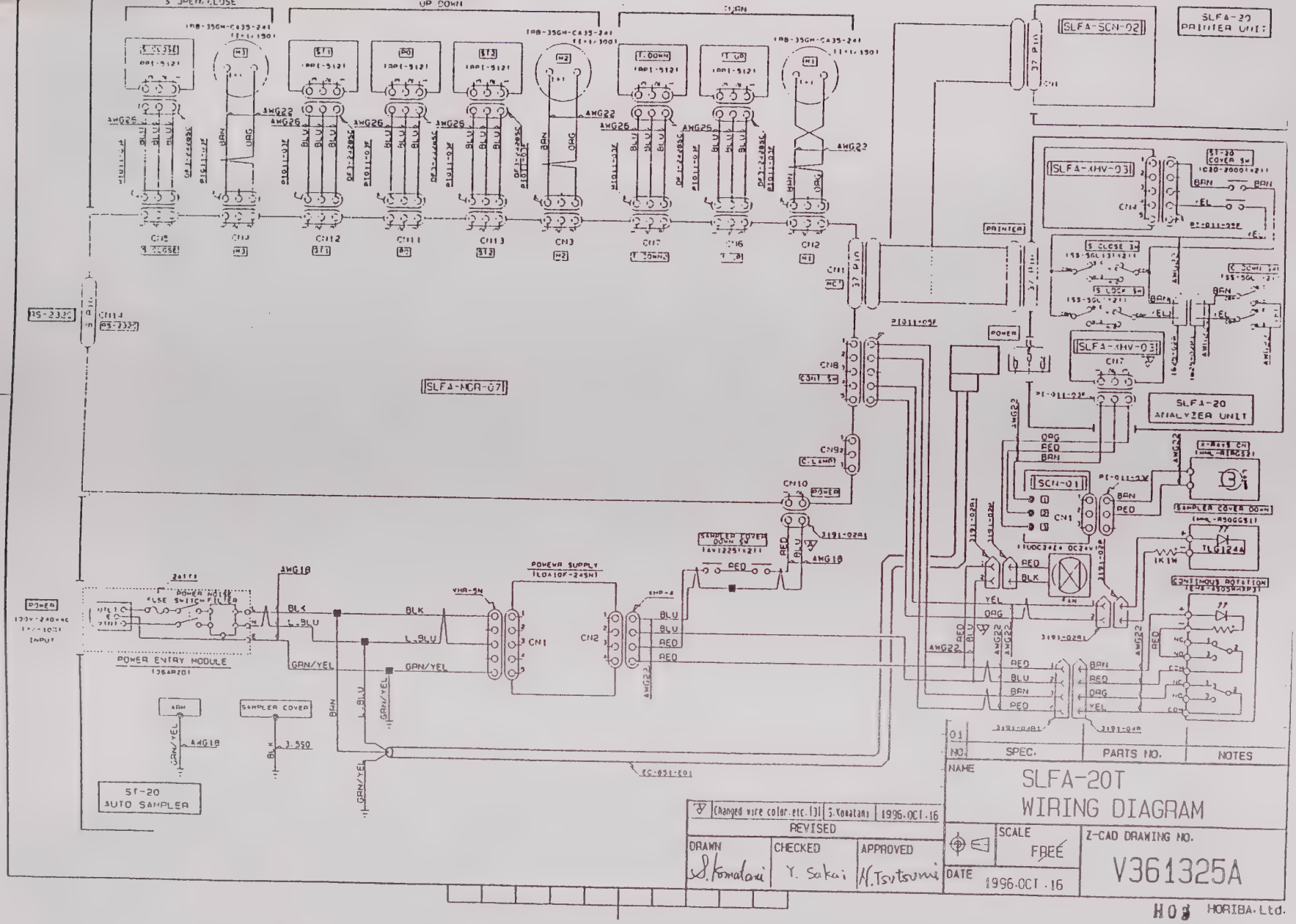
検認		19 . .			
照査		19 . .			
作成	ナガオ	1996.01.10			

指示	DD	1~	ナガオ	1996.01.18

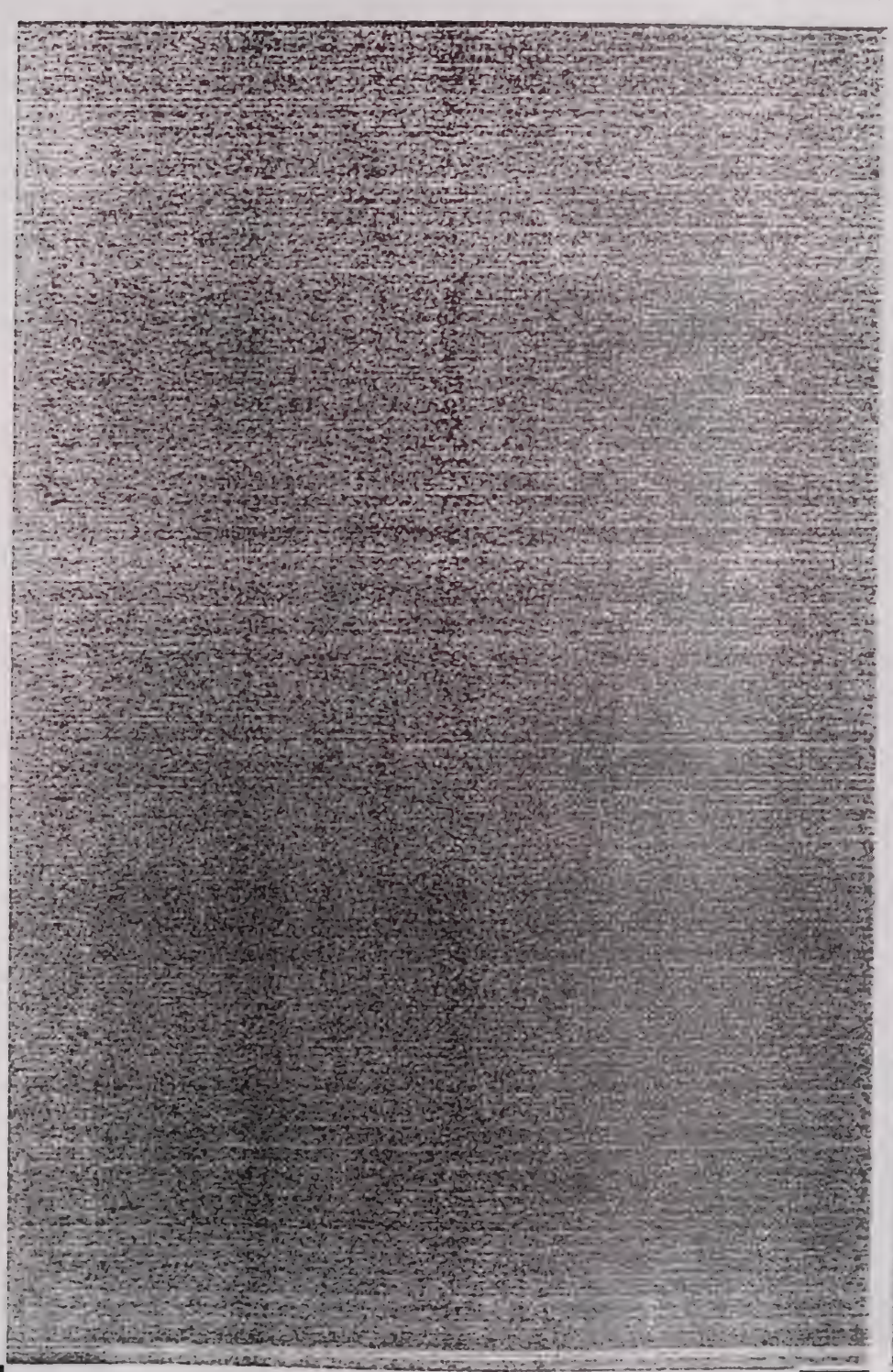
経歴


CL-150A-CD-T
PIC16C54
H570526-01
HC14
HC132
HC32
HC74
HC158
HC193
1S2835
CL-150A-CD-T X4
B3F-3150
ZJSA5101-102
T.UP
T.DOWN
T.DOWN2
S.CLOSE
CONT
STA
-100WN
-SOPEN
-H1ON
-H2ON
-STA
-TUP
-SCLOSE
-H2A 2-1F
-MH1ON 2-1G
-MH2ON 2-1G
-MH3ON 2-1H
-H1A 2-1E
Changed Circuit (R1, R8, R37, R94)
S.Nagao
1996.Feb.08
REVISED
DRAWN
CHECKED
APPROVED
NO.
SPEC.
PARTS NO.
NOTES
NAME
SLFA-MDR-07 (1/2)
CIRCUIT DIAGRAM
SCALE
FREE
DATE
1996.Feb.08
Z-CAD DRAWING NO.
V362751B
HORIBA, Ltd

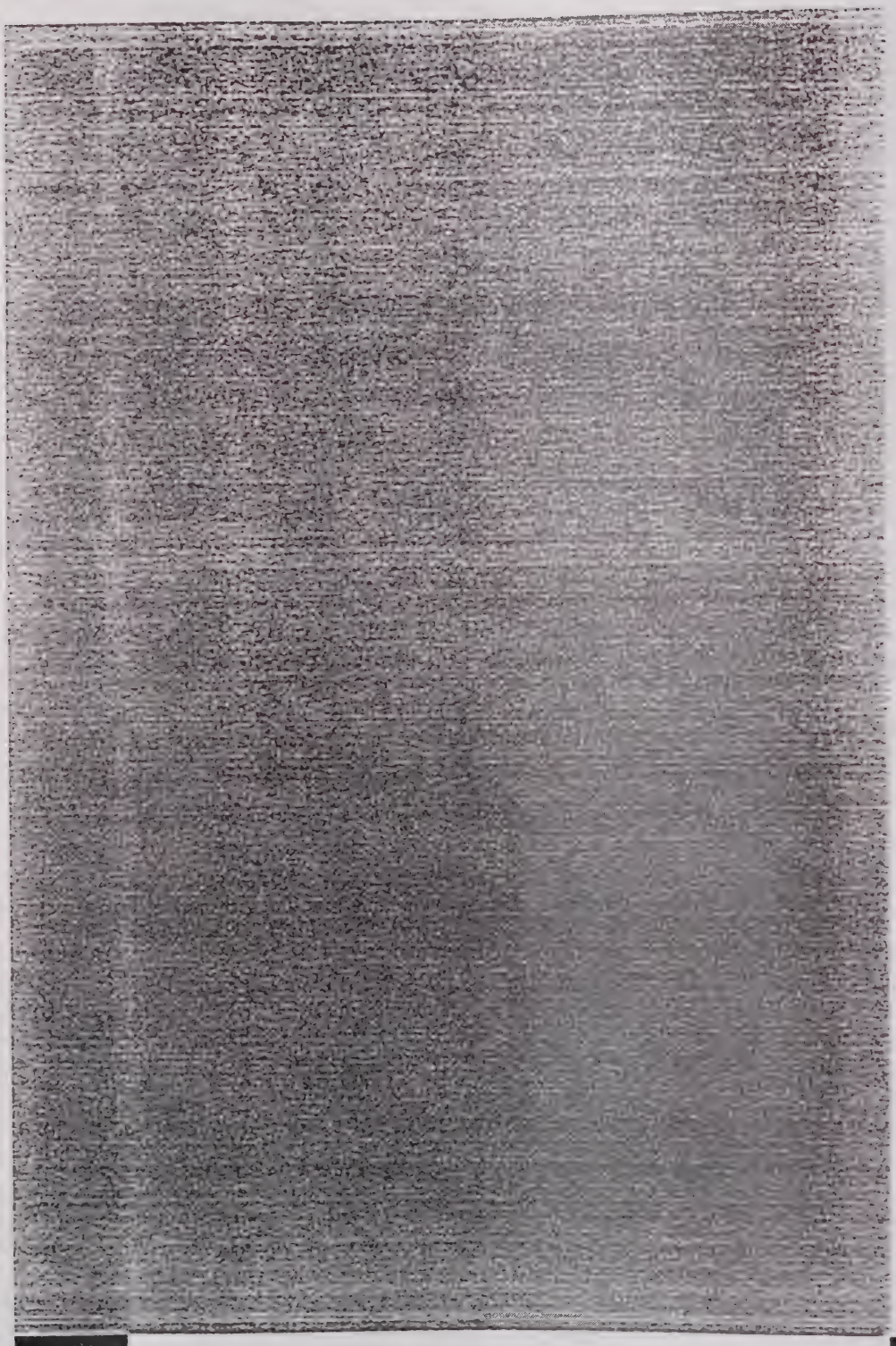

Z-CAD DRAWING NO. V362752B
HORIBA
EXTERIOR DRAWING
+24V
+5V
CN10
CN9
CN8
CN7
CN6
CN5
CN4
CN3
CN2
CN1
CN11
CN12
CN13
CN14
PS2703_1
G2R_24_DC24V
2SC1623
2SC2873
2SA812
2SB744
CL-150R_CD_T
PI071-05M-5
PI071-03M-5
5273-02A
PS-40PE-D4T2-M1
OELC-J9PAF-20LS
RS232C
POWER
C.CLAMP
SLFA-MDR-07 (2/2)
CIRCUIT DIAGRAM
SCALE FREE
DRAWN S.Nagao
CHECKED
APPROVED N.Tsukuma
DATE 1996.Feb.08
Modification of Parts 96.9.12 R48-50-54-56 S.Nagao 1996.Feb.08
REVISED
NO. SPEC. PARTS NO. NOTES
Z-CAD DRAWING NO. V362752B
HORIBA


SLFA-SCN-02
SLFA-20
PRINTER UNIT
SLFA-XHV-03
SLFA-XHV-03
SLFA-20
ANALYZER UNIT
SLFA-NCR-07
SCN-01
POWER ENTRY MODULE
136AR201
SF-20
AUTO SAMPLER
SAMPLER COVER
SAMPLER COVER DOWN SW
POWER SUPPLY
TLOA10F-24SN1
PRINTER
POWER
ST-20 COVER SW
S.CLOSE SW
C.DOWN SW
SAMPLER COVER DOWN SW
CONTINUOUS ROTATION
Changed wire color.etc.(3)
S.Konatani
1996.OCT.16
REVISED
NO.
SPEC.
PARTS NO.
NOTES
NAME
SLFA-20T
WIRING DIAGRAM
DRAWN
S.Konatani
CHECKED
Y. Sakai
APPROVED
H.Tsutsumi
SCALE
FREE
DATE
1996.OCT.16
Z-CAD DRAWING NO.
V361325A
HORIBA,Ltd.

NOTE



CHAPTER 11
ASSEMBLY OF THE SLFA–20 AND ST–20



CHAPTER 11
ASSEMBLY OF THE SLFA-20 AND ST-20

11. ASSEMBLY OF THE SLFA-20 AND ST-20

1. Unpacking

Unpack the ST-20 and confirm the contents of your package. In the package, other than the ST-20, the items listed below should also be present.

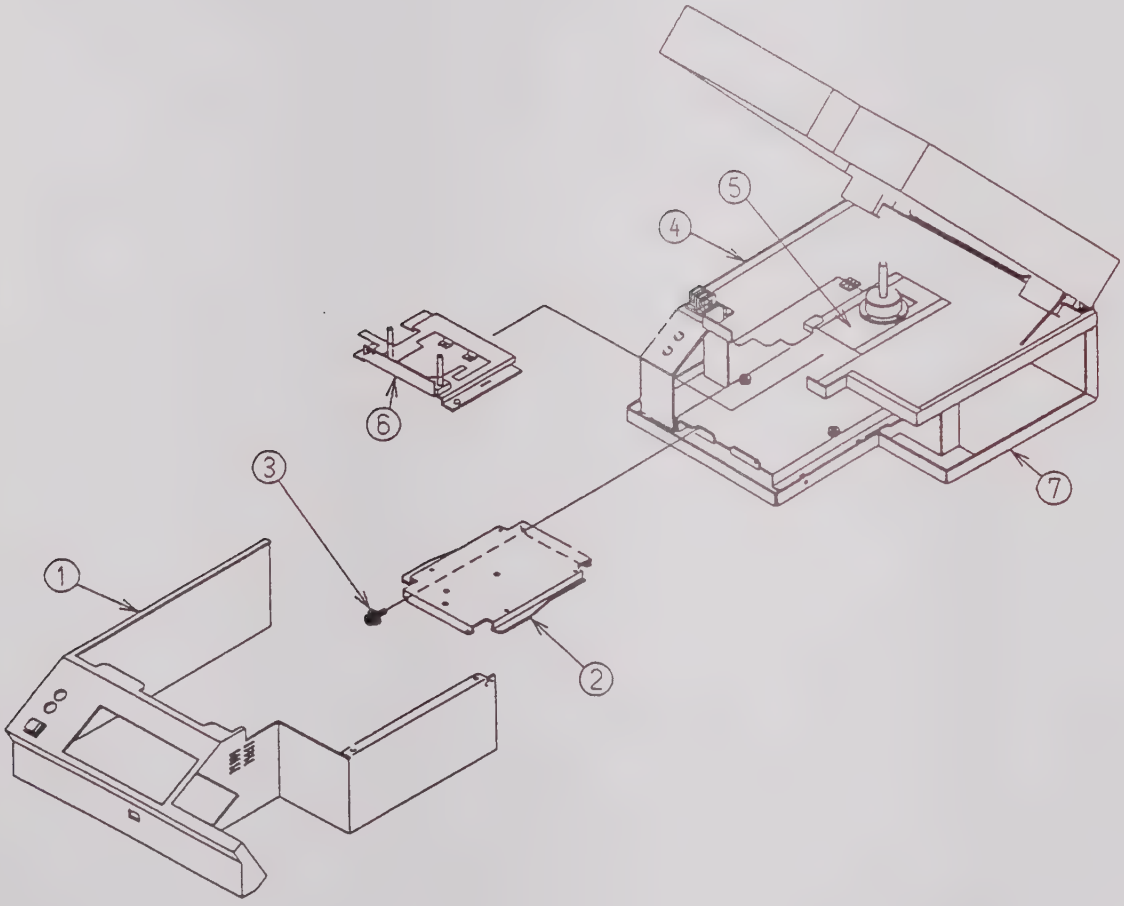
- ST-20 1
- Turntable 1
- Sample chamber cover 1
- Stopper unit 1
- Screw M3 × 6 (S-ZN3) w/ spring and flat washer ... 8
- Screw M4 × 6 (S-ZN3) w/ spring and flat washer ... 4
- Stay (M3) 1
- Operation manual (for SLFA-20T) 1
- SCN-01 circuit board 1
- Switch pusher 1

11. ASSEMBLY OF THE SLFA-20 AND ST-20

2. Disassembly and Measuring Unit Assembly and Adjustment

2-1. Disassembly of the ST-20

1 Remove the cover ①.
2 Remove the cables taped to the upper base ②.
3 Remove the screw ③ and remove the upper base ②.
4 Remove the front cover unit ⑥ connected to the inner cover ④ and connecting plate ⑤.
5 Remove the inner cover ④ from the chassis ⑦.



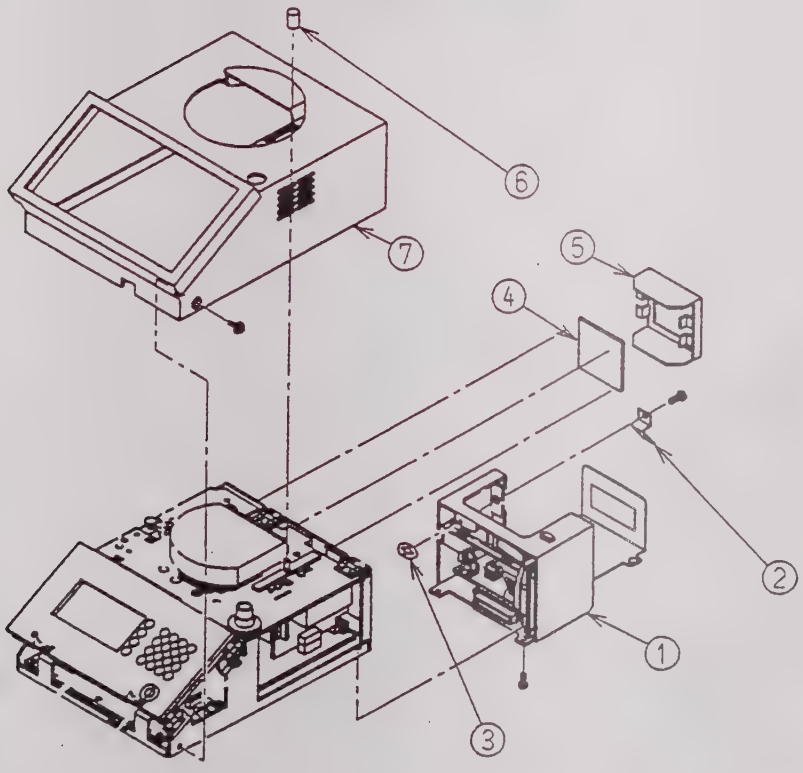
11. ASSEMBLY OF THE SLFA-20 AND ST-20

2-2. Disassembly of the SLFA-20 Measuring Unit

1 Remove the printer unit ①.
2 Remove the printer unit holder ⑪ and washer ③.
3 Remove the filter ④ and filter cover ⑤.
4 Remove the lever grip ⑥ (using a wrench or similar tool).
5 Remove the measuring unit cover .

Note▸▸▸ The parts listed below are not needed for the SLFA-20T and can be disposed of.

1. Holder ②
2. Washer ③
3. Filter ④
4. Filter cover ⑤
5. Lever grip ⑥
6. Cover ⑦



11. ASSEMBLY OF THE SLFA-20 AND ST-20

- **Disassembly of the SLFA-20 Measuring Unit (Cont.)**

Ver. 1 Ver. 2

1 Remove the X-RAYS ON lamp ①. Remove the XHV-03 CN7 connector ②.

2 Remove the lamp spacer ③.

3 Remove the cover switch connecting cable ④.

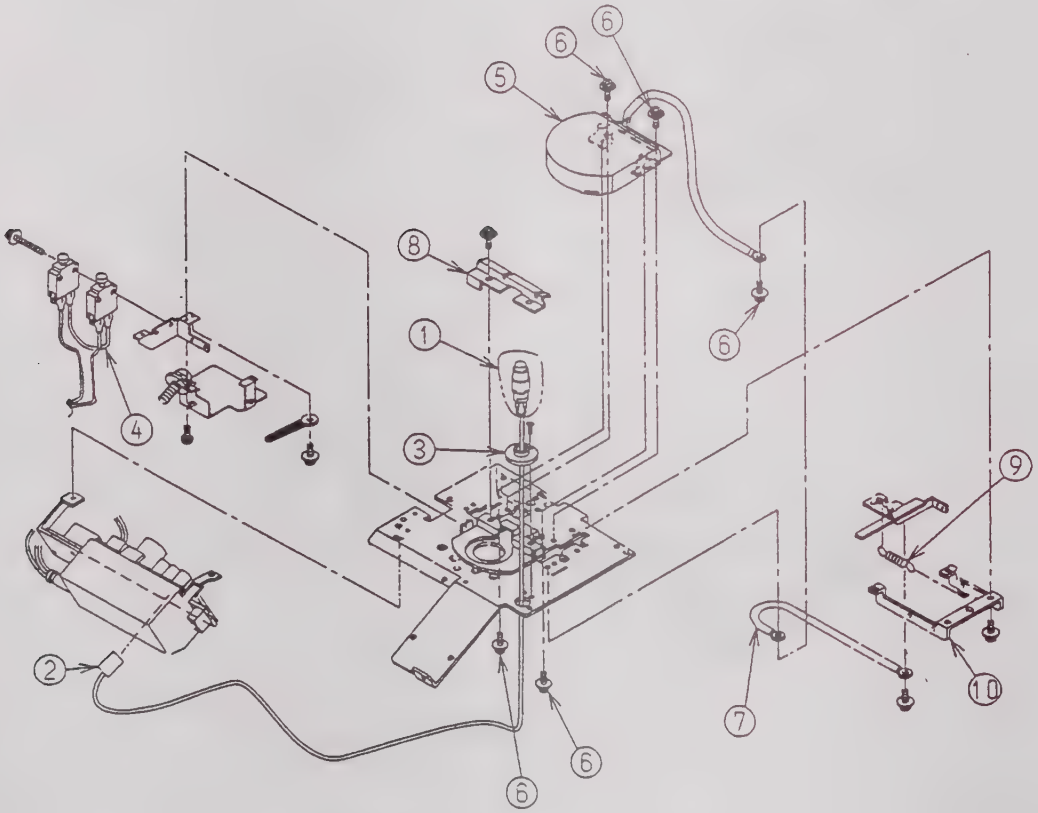
4 Remove the five screws ⑥ and remove the chamber cover unit ⑤. Reattach the cable ⑦, previously removed, to its original location.

5 Remove the film holder cover ⑧.

6 Remove the end of the spring ⑨ attached to the shaft retaining plate ⑩.

Note▸▸▸ The parts listed below are not needed for the SLFA-20T and can be disposed of.

1. Lamp spacer ③
2. Cover switch connecting cable ④
3. Chamber cover unit ⑤
4. Film holder cover ⑧



Ver. 1 Ver. 2

11. ASSEMBLY OF THE SLFA–20 AND ST–20

- **Disassembly of the SLFA–20 Measuring Unit (Cont.)**

Ver. 3 Ver. 4

1 Remove the X–RAYS ON lamp ①. Remove the XHV–03 CN7 connector ②.

2 Remove the lamp spacer ③.

3 Remove the cover switch connecting cable ④.

4 Remove the five screws ⑥ and remove the chamber cover unit ⑤. Reattach the cable ⑦, previously removed, to its original location.

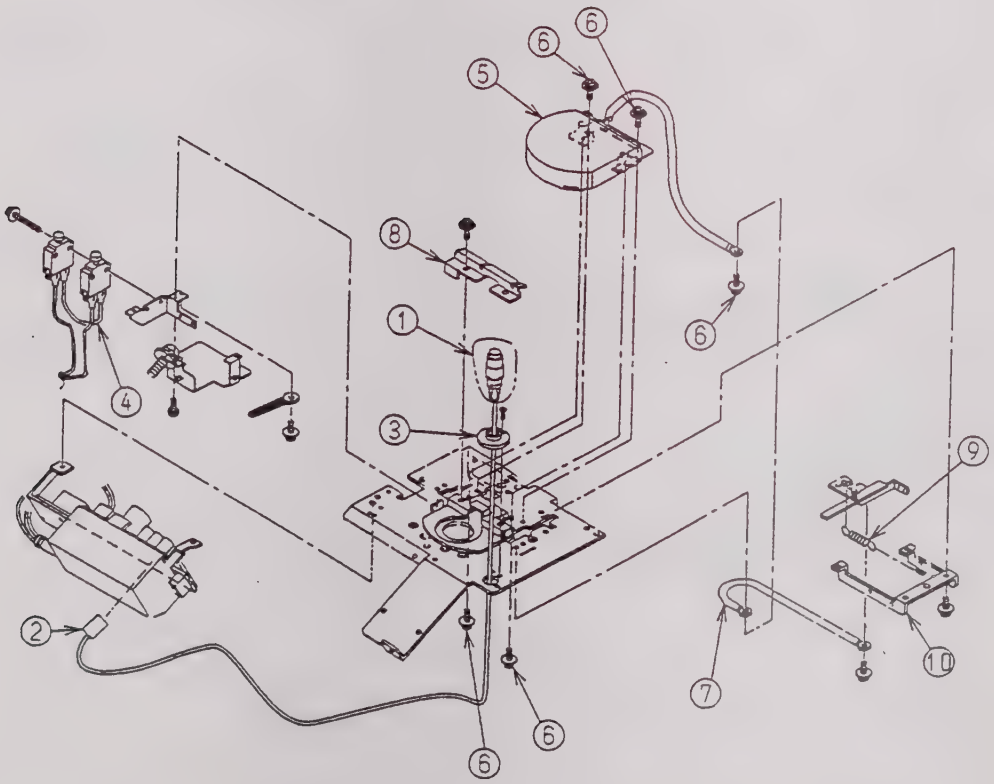
5 Remove the film holder cover ⑧ and the stay ⑫.

6 Remove the end of the spring ⑨ attached to the shaft retaining plate ⑩.

7 Remove the skimmer seal ⑬.

Note▸▸▸ The parts listed below are not needed for the SLFA–20T and can be disposed of.

1. Lamp spacer ③
2. Cover switch connecting cable ④
3. Chamber cover unit ⑤
4. Retainer cover ⑧
5. Stay ⑫
6. Skimmer seal ⑬



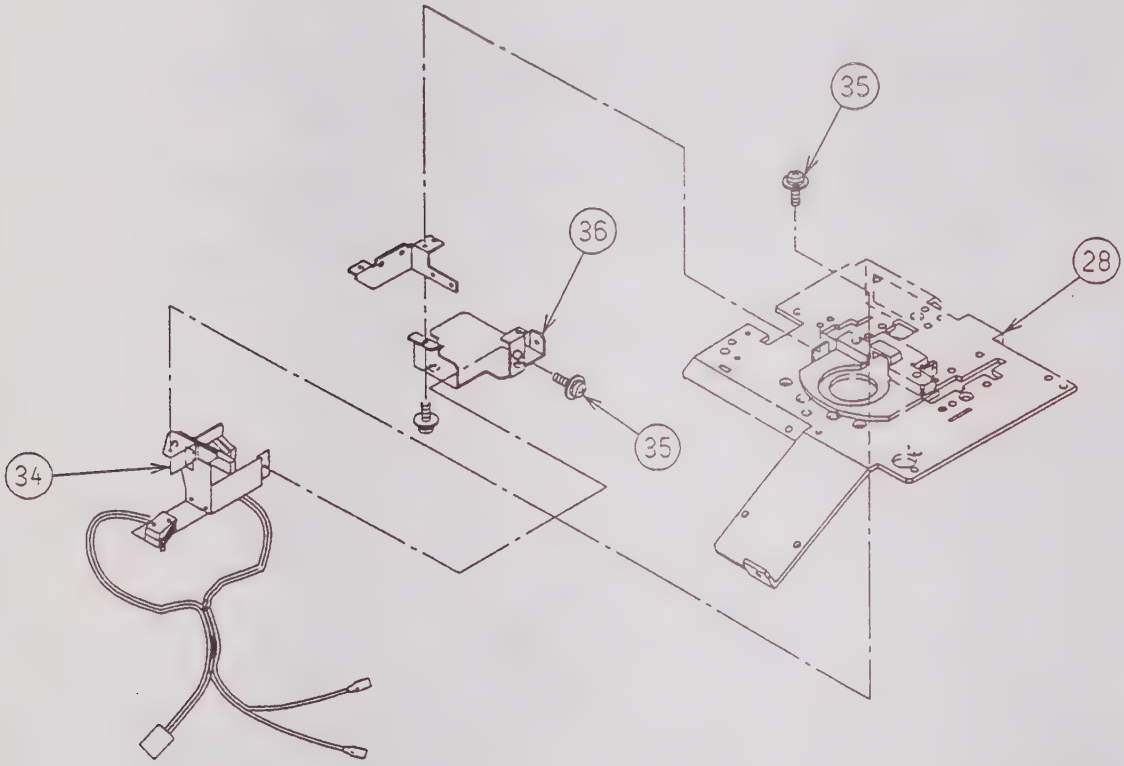
Ver. 3 Ver. 4

11. ASSEMBLY OF THE SLFA–20 AND ST–20

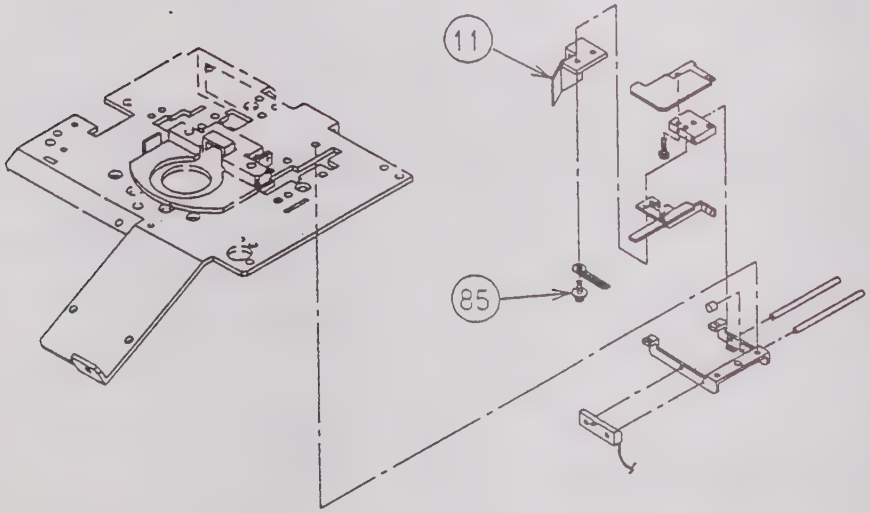
2-3. Assembly of SLFA–20 Measuring Unit

1 Attach the provided stopper unit ㉞ with the two provided M3 × 6 pan–head screws ㉟ to the inlet cover ㊱ and shutter base ㉘.

Note►►► Care must be taken not to hook the wiring with the spring of the stopper unit.



2 Temporarily remove the screw ㉟ holding the lever and then tighten it with the provided switch pusher ⑪.



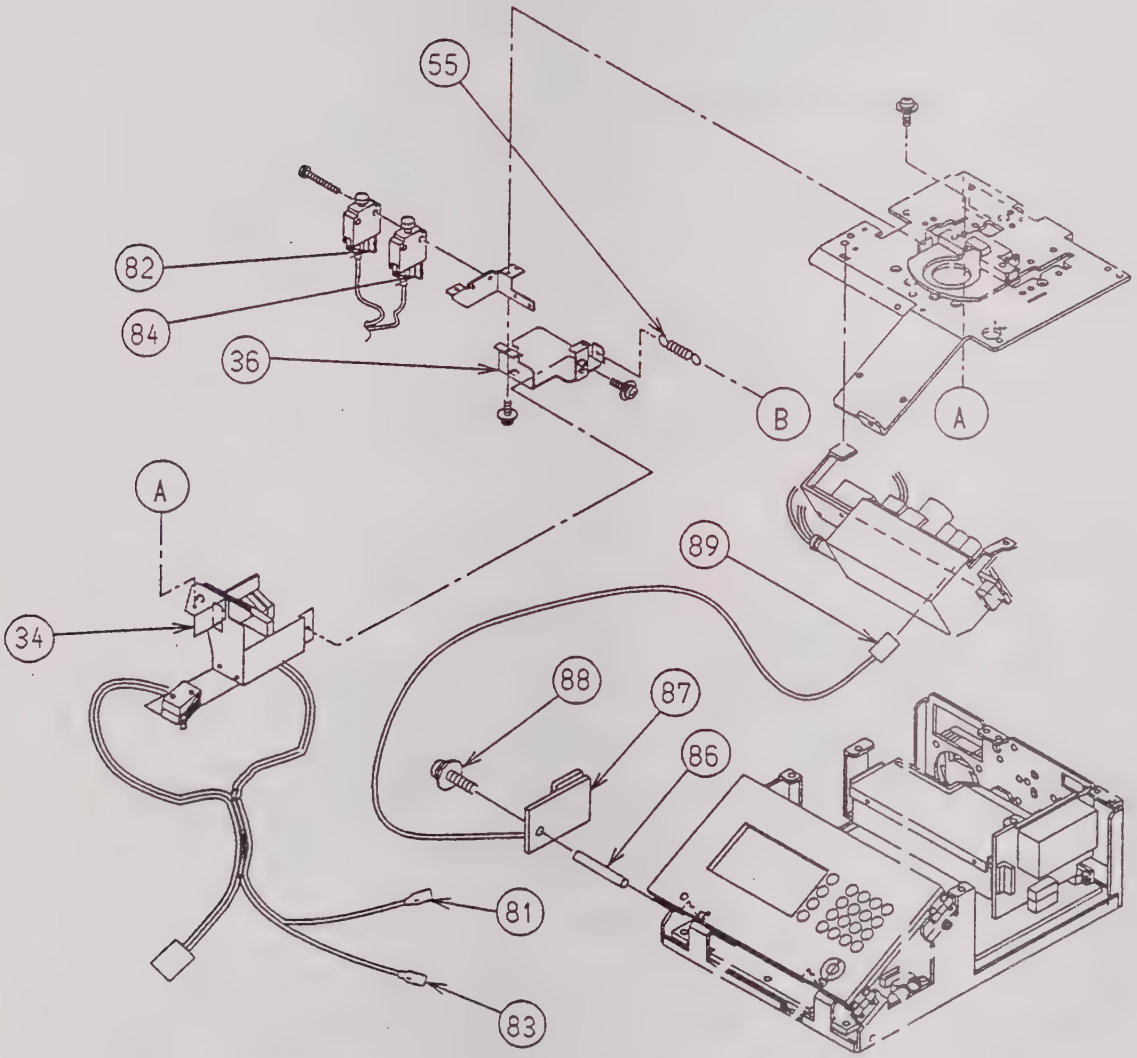
11. ASSEMBLY OF THE SLFA–20 AND ST–20

3 Attach the spring (55) to the inlet cover (36).

4 Attach the cable terminal (81) of the stopper unit (34) to the cover switch terminal (82). Also attach the terminal (83) to terminal (84).

5 Attach the provided stay (86) and SCN–01 circuit board (87) with the provided M3 × 6 pan–head screw (88) to the measuring unit chassis.

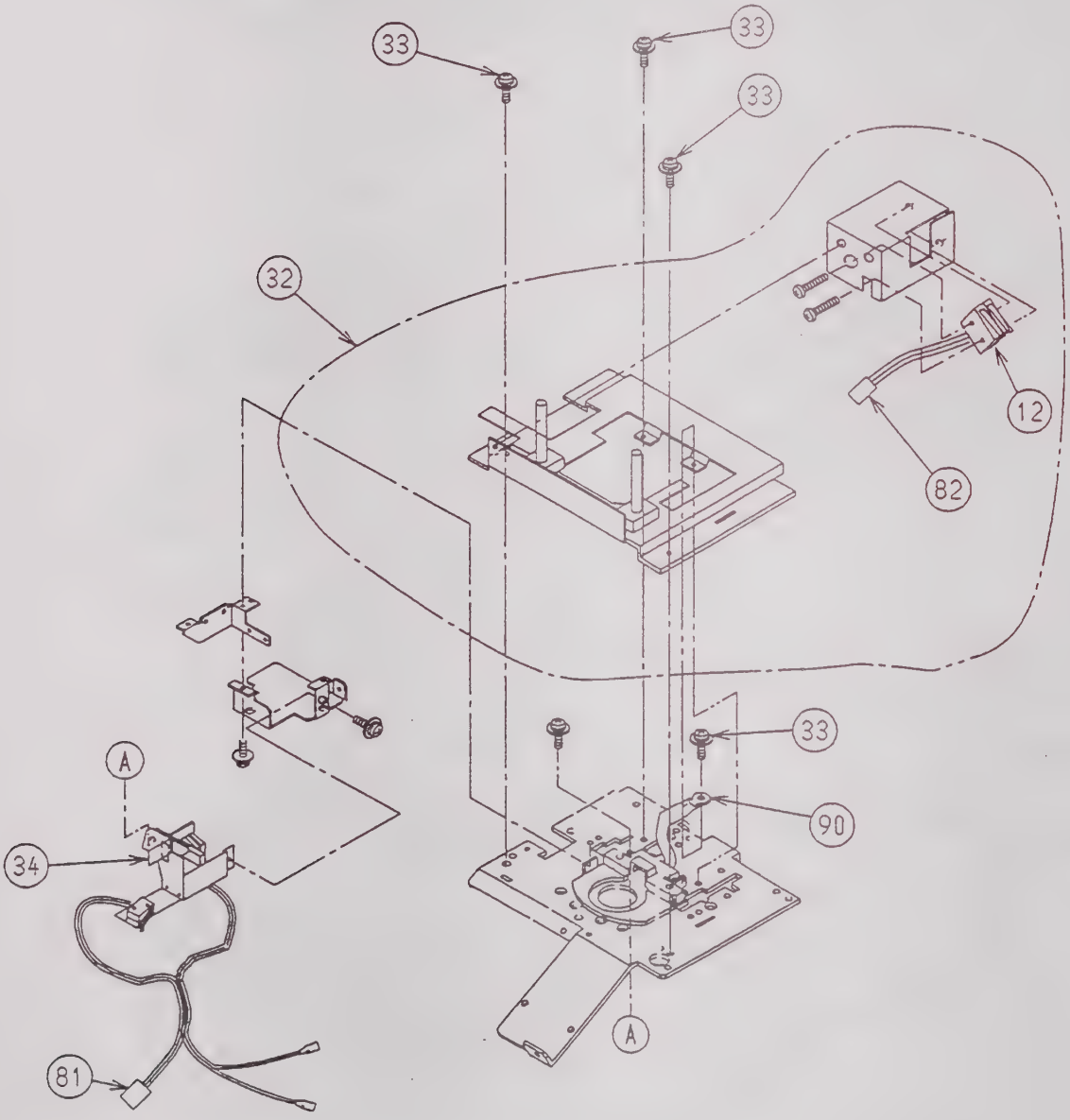
6 Attach the SCN–01 connector (89) to the XHV–03 CN7 connector.



11. ASSEMBLY OF THE SLFA–20 AND ST–20

7 Attach the front cover unit ㉜ to the shutter base ㉘ with the provided four M3 × 6 pan–head screws ㉝. Also, tighten down the cable ㊿ together.

8 Connect the chamber cover DOWN switch ⑫ connector ㉜ to the stopper unit ㉞ connector ㉛.



2-4. Adjusting the Shutter Open/Close Switch and Lock Switch

Perform the same procedure as described in Chapter 8, 2–4.

11. ASSEMBLY OF THE SLFA–20 AND ST–20

3. Overall Adjustment and Verification

3-1. Attaching of the SLFA–20

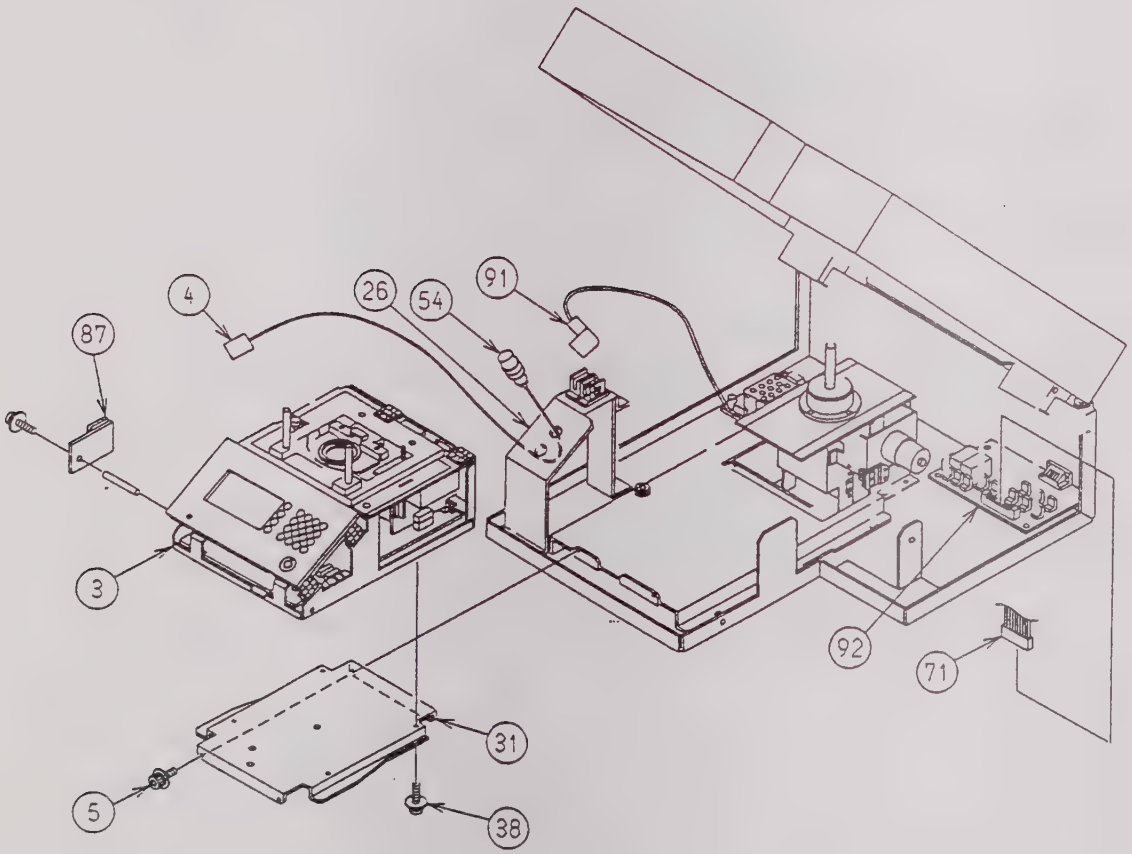
1 Attach the upper base ㉛ to the measuring unit ③ with the provided four M4 × 6 pan–head screws ㊳.

2 Secure the measuring unit (use the two screws ⑤).

3 Attach the cable ㉛ to the measuring unit's power inlet.

4 Connect the flat cable ㉛ to the measuring unit ③ and the MDR–07 circuit board ㉜.

5 Attach the X–RAYS ON lamp ㊹ to the lamp stay ㉖. Attach the lamp connector ④ to SCN–01 ㊼.



11. ASSEMBLY OF THE SLFA-20 AND ST-20

3-2. Power Supply Unit Adjustment

1 Remove CN10 of [MDR-07].

2 Verify that two 2A (T) fuses are in the power supply module (one fuse with one extra fuse).

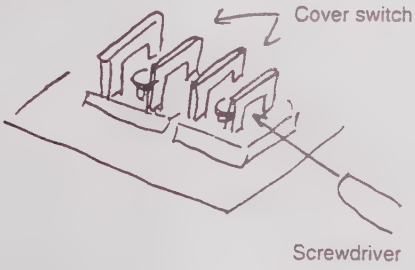
3 Connect the power supply cable to inlet and measure the insulation resistance. More than 100 MΩ when tested with an insulation resistance tester (megger).

4 Verify the voltage at the continuous rotation connector inserted at CN10 of [MDR-07].
Verify 24 VDC ± 1 V

5 Verify that the fan is rotating.

3-3. Positioning Adjustment

1 If the SLFA-20 cover switch is pulled and locked on, turn it off (press once and release to turn off).



2 Force on the sampler cover DOWN switch.

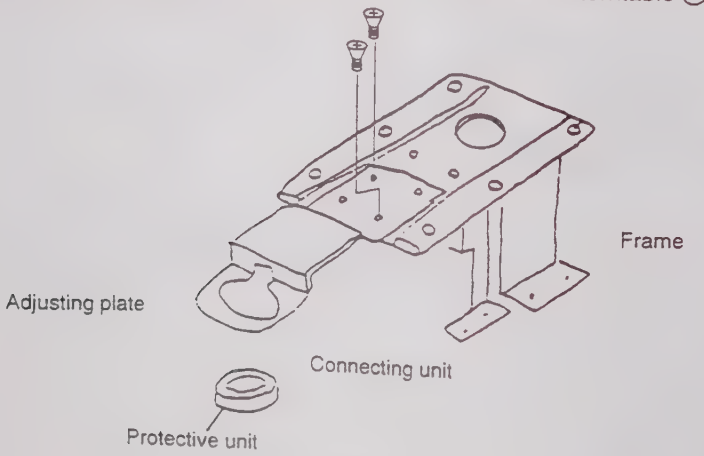
3 Turn on the power supply and the turntable will begin rotating. Soon after an error will sound. Press F4 (EXIT) a number of times to change to the READY screen.

4 Verify that the X-RAYS ON lamp is off.

5 Go to the [CHECK1] screen.

6 Remove the adjustment plate ⑭ from the chassis and attach it to the connecting plate ⑮. Loosen the six connecting screws ㉚ of the lower base and move the SLFA-20 unit so that the center of the hole of the adjusting plate matches with the center of protective film unit.

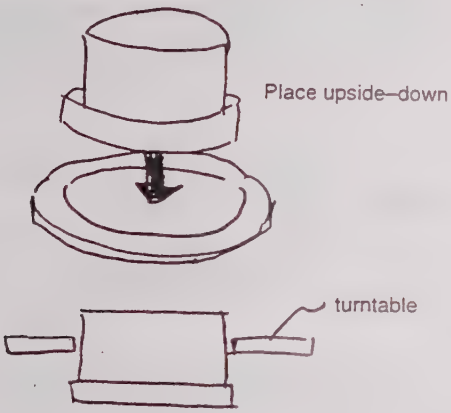
7 Attach the adjusting plate to its original position and attach the turntable ⑨.



11. ASSEMBLY OF THE SLFA–20 AND ST–20

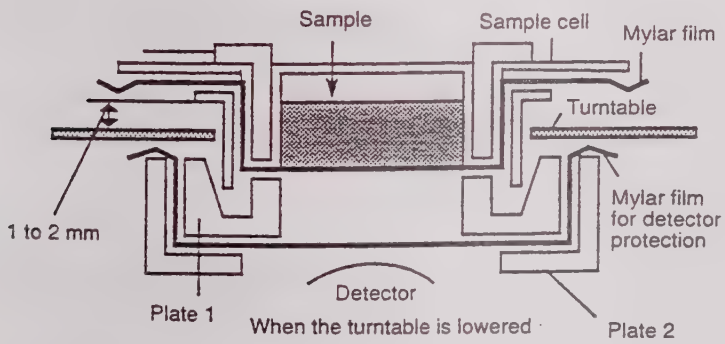
Note▸▸▸ The circled part numbers correspond to the part numbers on the exploded drawings on pages 8–4 through 8–6.

8 Assemble only the inner and outer frames of the test cell, and place it on the test sample plate upside down.



9 Use the [F1] NXTPOS to move the turntable to positions 1 through 12, and check that the test cell is coming through the turntable hole without contacting the turntable. Re–adjust the position if the test cell contacts the turntable.

10 Take the test cell off the plate, and place it at position 1. When it comes to the analysis position, check that it is oriented as shown in the diagram below. Repeat this check for positions 2 through 12.

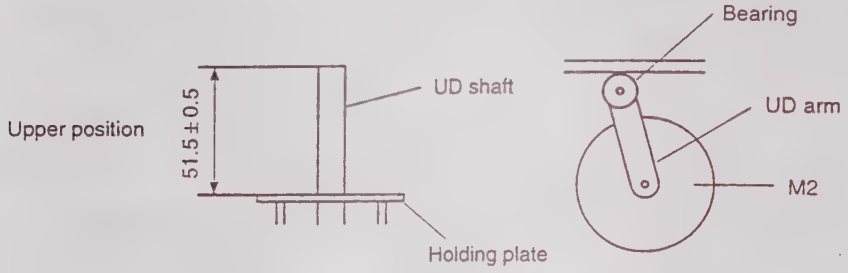


11. ASSEMBLY OF THE SLFA-20 AND ST-20

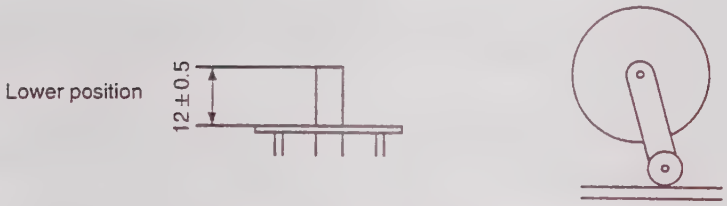
3-4. Verifying the turntable's elevator operation positions

1 Press the F2 (UP/DN) to move the turntable and lower the UD shaft ⑯.

2 Confirm that when F2 is pressed and UD shaft first begins to move from the stationary state, it moves roughly 1 mm upward (from the upper position) or downward (from the lower position). The UD shaft ⑯ should be 51.5 mm ± 0.5 mm above the holding plate in the upper position and 12 mm ± 0.5 mm above the holding plate in the lower position.



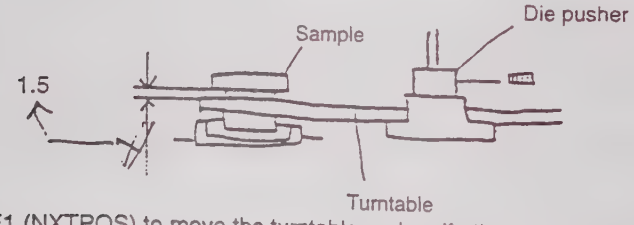
The UD shaft should move upward roughly 1 mm when it first begins to move



The UD shaft should move downward roughly 1 mm when it first begins to move

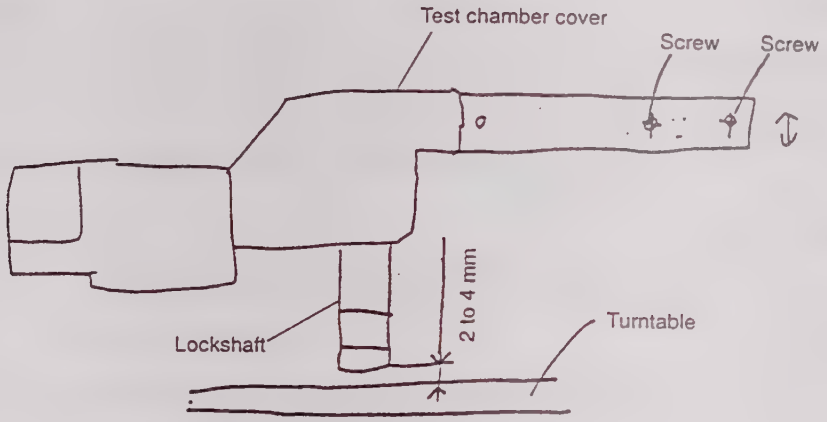
3 Attach the turntable ⑨ with the UD shaft in the lower position.

4 Place the sample in the turntable's sample hole.



5 Press F1 (NXTPOS) to move the turntable and verify that the sample enters the protective unit correctly, and that a gap of 1 to 2 mm between the sample and the turntable is maintained. If there is no vertical gap, adjust the position of the die pusher ⑳. While the turntable is rotating, verify that sample does not contact the front cover.

11. ASSEMBLY OF THE SLFA–20 AND ST–20



6 With the UD shaft raised, attach the test chamber cover ⑦. Make sure there is a gap of 2 to 4 mm between the lockshaft and the turntable ⑨. If the gap is too narrow, adjust by loosening the screws shown in the illustration and those on the opposite side

3-5. Adjusting the Shutter Open/Close Positions and Chamber Cover DOWN Switch

Perform the same procedure as described in Chapter 8, 3–2–f.

3-6. Adjusting the Roller Catch

Perform the same procedure as described in Chapter 8, 3–2–g.

3-7. Verifying the Overall Operation

Perform the same procedure as described in Chapter 8, 3–2–i.

11. ASSEMBLY OF THE SLFA-20 AND ST-20

4. Inspection

4-1. Performance Inspection

4-1-a. Preparation

Perform the same preparations as described in the performance inspection given in Chapter 5.

4-1-b. Inspection Mode

After at least 30 minutes of aging, enter and start the Inspection Mode of S. MAINTENANCE in Chapter 4.

4-1-c. Verification

Verify that it satisfies the performance inspection's working curve, scale accuracy, repeatability and reproducibility qualifications.

4-2. Safety Inspection

Perform the same operations as described in the safety inspections given in Chapter 5.

11. ASSEMBLY OF THE SLFA-20 AND ST-20

4-3. Label Verification

Check that all labels (including silk screen prints) are attached to the instrument, and that there are no marks or damages to their display.

1 Instrument Rating Nameplate (instrument rear side) Refer to figure 2.5

2 Safety labels

- Radiation caution (arm top)
- Electric shock caution (instrument left side)
- High voltage caution (instrument left side)
- Radiation caution (instrument left side)
- (Handling) CAUTION (instrument left side)
- Electric shock caution (power cable)
- Safety mechanism release caution (inner cover top)

3 Other displays and labels

- FCC label (instrument left side)
- CE mark (instrument left side)

Note▸▸▸ Regarding the CE mark, cover it with a white label. After the CE procedures are completed, the tape will then be unnecessary. Instruction will be given separately.

- [X-RAYS ON] (operation panel)
- [POWER] and [2A(T)] (instrument rear side)
- [FEED] (printer unit)
- [LCD CONT.] (instrument lower portion all sides)
- [SAMPLER COVER DOWN], [CONTINUOUS ROTATION], and product nameplate (operation panel)
- [RS-232C], [RESET] (instrument rear side)

11. ASSEMBLY OF THE SLFA-20 AND ST-20

4-4. Miscellaneous

4-4-a. Verification Results of Adjusting and Checking Operations

Recheck whether the adjustment and verification operations listed in the adjustment instructions were satisfactory.
(Check with the adjustment check sheet)

4-4-b. Inspection of External Appearance and Construction

Inspect whether there are any abnormalities with the visual appearance and construction.

4-4-c. Quantity check

- SLFA-20T 1
- Operation manual 1 book
- Inspection results booklet 1 booklet
- Turntable 1
- Sample chamber cover 1

If the SLFA-20 is sent from a customer with the power cord, protective film unit, etc. attached, check these also.

4-4-d. Creating the Inspection Results Booklet

Create the Inspection Result Booklet in the same style as shown on the next page.

11. ASSEMBLY OF THE SLFA-20 AND ST-20

検査成績書

1．仕様

型式品名	蛍光X線硫黄分析計　　SLFA-20T
Mfg.No.	
測定範囲	0.0000～5.0000m/m%　，　0～50000ppm
電　源	AC 100 ～ 240V　50/60Hz　100VA

2．検査結果

1）外観構造検査 ---------- □

2）動作機能検査 ---------- □

a．液晶表示
b．ファンクションキー、測定キー
c．プリンター
d．テンキー
e．オートサンプラー動作

3）再現性検査 ---------- □

m/m%点	測定時間	回数	規格 σ_{n-1}	検査結果 σ_{n-1}
0 m/m%	600 sec	10 回	0.0015m/m% 以下	m/m%
1 m/m%	600 sec	50 回	0.0015m/m% 以下	m/m%
4 m/m%	600 sec	10 回	0.0060m/m% 以下	m/m%

4）X線漏洩（1．0μSv/h以下） ---------- □

測定箇所		測定値 (μSv/h)	バックグランド (μSv/h)	漏洩X線量 (μSv/h)
ｻﾝﾌﾟﾗｰｶﾊﾞｰ（開）	操作パネル			
	装置左面			
	装置右面			
	装置後面			
	装置上面			
ｻﾝﾌﾟﾗｰｶﾊﾞｰ（開）	試料室カバー（上）			
	試料室カバー（下）			

5）絶縁抵抗
（AC－E間　DC1000Vメガーにて測定し、5MΩ以上） ---------- □

6）付属品検査 ---------- □

3．総合判定 ---------- □

承認	検査

19　年　月　日
株式会社　堀場製作所

11. ASSEMBLY OF THE SLFA-20 AND ST-20

TEST REPORT

1. Specifications

Model	Sulfur-in-oil analyzer　S L F A - 2 0 T
Range	0.0000～5.0000 m/m%　,　0～50000ppm
MFG. No.	
Power source	AC 100V ～ 240V , 50/60Hz 100VA

2. Inspection results

1) Appearance and construction ---------- Good

2) Operation and function ---------- Good

a. Display
b. Function keys, measurement key
c. Printer
d. Numeric keys
e. Auto sampler

3) Repeatability ---------- Good

(the analyzer must meet the following repeatability criteria to pass QA)

a. 0m/m% S standard measured 10 times at 600 seconds per measurement:
Standard Deviation(sd) less than 0.0015m/m%S ---- Result:sd=_____m/m%S

b. 1m/m%S standard measured 50 times at 600 seconds per measurement:
sd less than 0.0015m/m%S ---------- Result:sd=_____m/m%S

c. 4m/m%S standard measured 10 times at 600 seconds per measurement:
sd less than 0.0060m/m%S ---------- Result:sd=_____m/m%S

4) X-ray leakage ---------- Good

(Less than 1μSv/h)

Measurement position		Measurement value(μSv/h)	Background (μSv/h)	X-ray leakage (μSv/h)
Sampler cover (Open)	Front side			
	Left side			
	Right side			
	Rear side			
	Upper side			
Sampler cover (Close)	Chamber cover(Up)			
	Chamber cover(Down)			

Instrument : Survey meter VICTOREEN model 440RFC
Test position : Distance between analyzer and survey meter is 5cm.

5) Insulation resistance ---------- Good

(More than 5MΩ with 1000V DC megger between AC line and grounding)

6) Accessories ---------- Good

3. Overall inspection ---------- Passed

Inspected by

Inspection Date : _____.

_____

Supervised by

HORIBA Ltd.

_____

11. ASSEMBLY OF THE SLFA-20 AND ST-20

5. Packaging

1 Remove the sample chamber cover.

2 Remove the turntable. The screws are located on the instrument side.

3 Attach the protective film holder with drafting tape (two locations).

4 After cleaning the instrument and fixing any scratches, wrap the instrument with the vinyl cover.

5 Arrange all provided parts.

a. Turntable (pack with bubble wrap)

b. Operation manual (HORIBA A4 vinyl envelope)

c. Inspection result booklet (HORIBA A4 vinyl envelope)

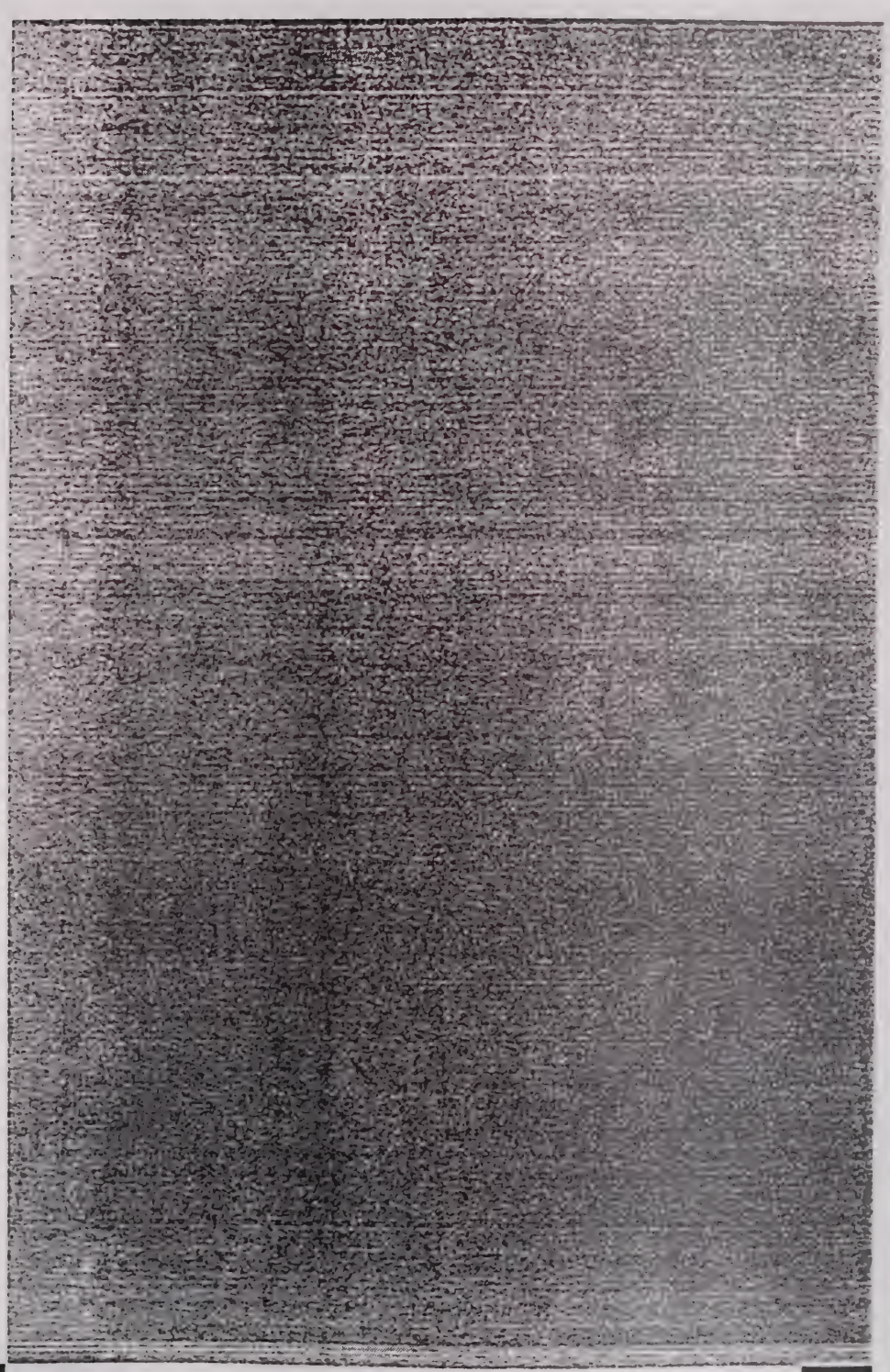
d. Sample chamber cover (pack with bubble wrap)

If the customer also sent the power cord, protective film unit, etc., pack these along with the other provided parts.
Attach the turntable to the top of the instrument (using tape). All other parts are to be packed in the space in the upper packing cushion for provided parts.

6 Place the lower packing cushion, instrument, upper packing cushion, and provided parts, in that order, in the box, and tape closed (in the space in the upper packing cushion for provided parts, place some more foam packing as necessary).

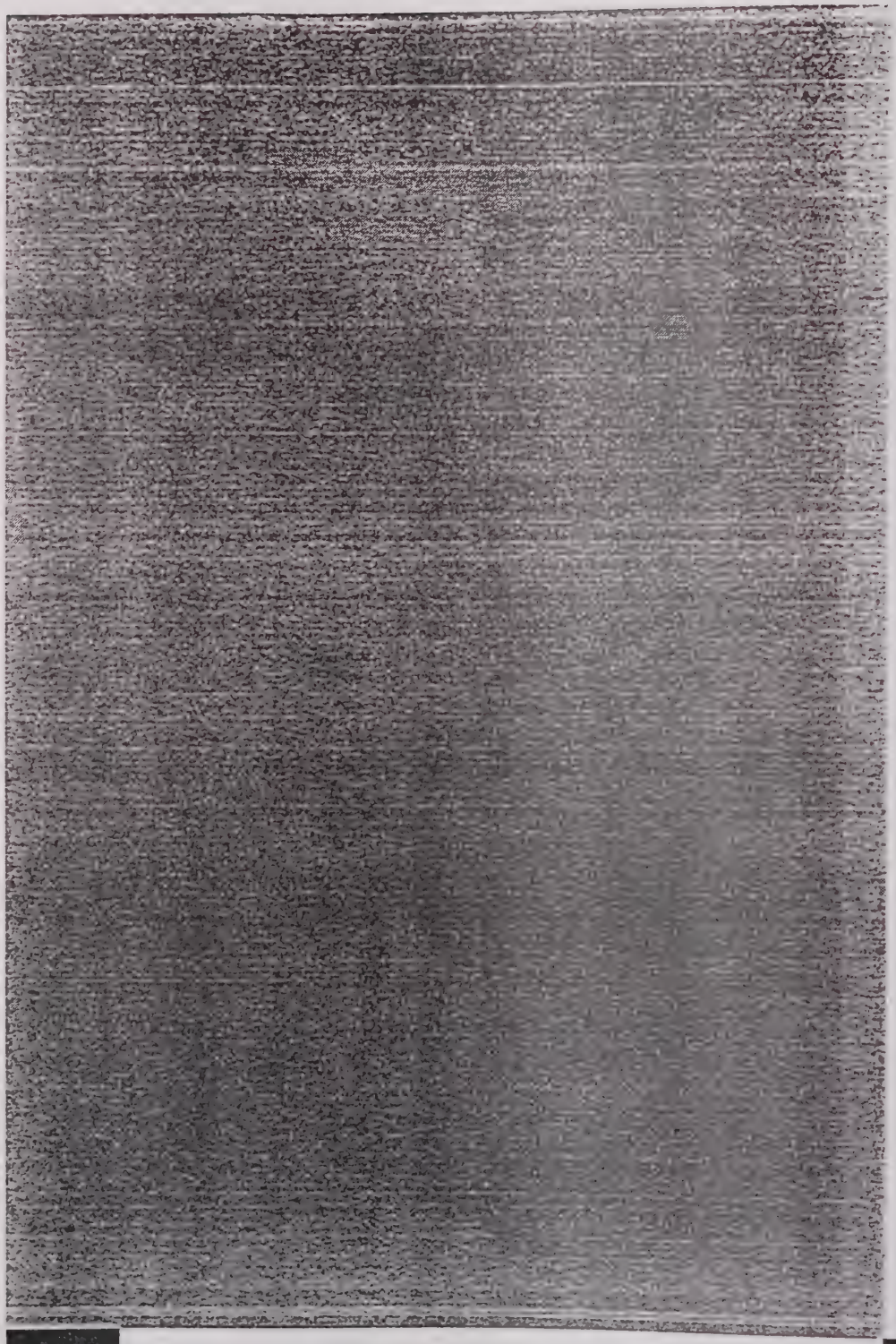
7 Wrap the box with a packing band.

NOTE



CHAPTER 12

PARTS LIST



CHAPTER 12

PARTS LIST

PARTS LIST

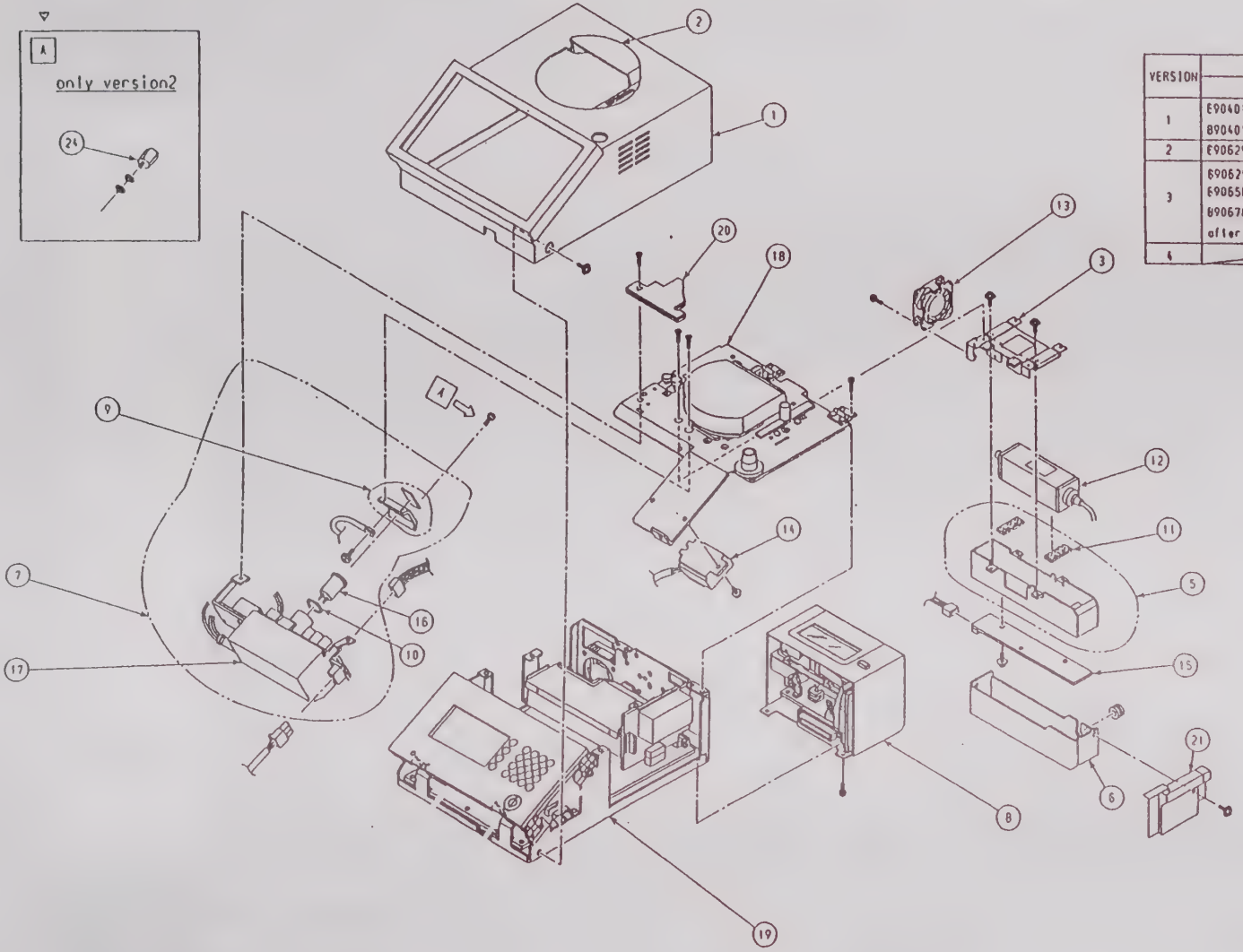
SULFUR-IN-ANALYZER

< SLFA-20 >

UNIT NAME	DRAWING NO.
GENERAL VIEW	S220012C
CHASSIS UNIT	S220014A
CHAMBER UNIT	S220013D
PRINTER UNIT	S220015A

CODE: P950002801

HORIBA, Ltd.
KYOTO, JAPAN



▽ VERSION HISTORY

VERSION	MFG No.	
	SLFA-20	SLFA-201
1	E904010101 to 8904010105 8904010201 to 8904010220	8905580101 to 8905580110
2	E906290101 to 8906290105	
3	8906290106 to 8906290110 8906560101 to 8906560110 8906780101 to 8906780110 after 706001	8908190101 to 8908190110 8907100101 to 8907100110
4		after 707001

▽	addition of No.24	K.SHIGA	1997.MAY.22
▽	addition of No.21	K.SHIGA	1997.FEB.20
▽	addition of No.17,18,19	K.SHIGA	1995.NOV.29

REVISED		
DRAWN	CHECKED	APPROVED
K.SHIGA	M.MIZUTA	T.OBORI

S911787A

No.	SPEC.	PARTS NO.	NOTES

NAME: SLFA-20 GENERAL EXPLODED VIEW

SCALE: 1/1

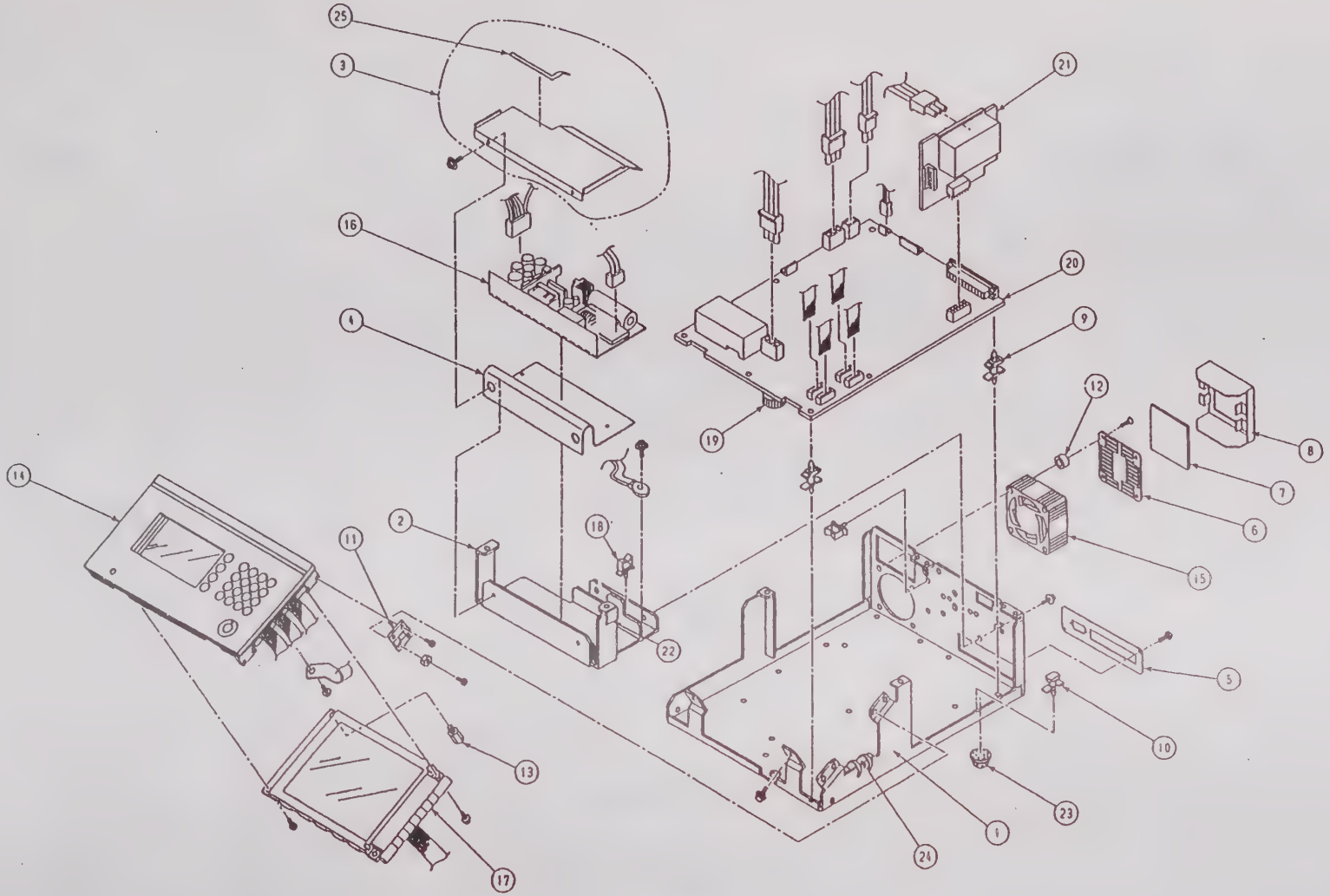
DATE: 1997.MAY.22

A-CAD DRAWING NO.: S220012C

No.	PARTS No.	PARTS NAME	DESCRIPTION
1	U801315300	COVER	FOR SLFA−20
2	U801315400	REAR, COVER	FOR SLFA−20
3	H584854−01	STOPPER−L	SUS304FOR SLFA−20
4	H580207−01	STOPPER	SUS304FOR SLFA−20
5	U801316700	STOPPER, COVER	FOR SLFA−20
6	U801316300	COVER PCB,−2	FOR SLFA−20
8	S911790A	PRINTER	PLEASE REFER TO DRAWING S
9	U801315700	COLLI MATOR	FOR SLFA−20
10	H581738−01	PACKING,X−RAY T	FOR SLFA−20
11	F020471700	SPONGE	8X2T(CR−SPONGE), BY METER
12	U801234100	PROPORTIONAL CO	FOR SLFA−20
13	F023042900	FAN, DC	KDE 0506 PHS2
14	U801234000	TRANSFORMER,−1	FOR SLFA−20
15	U801234200	PCB, ASSY	SLFA−SPR−03/SLFA−20
16	E013006000	X−RAY TUBE	N6268
17	U802003200	HV UNIT BASE	SLFA−20
18	S911788A	CHAMBER UNIT	PLEASE REFER TO DRAWING S220013−01
19	S911789A	CHASSIS UNIT	PLEASE REFER TO DRAWING S220014−01
20	H386185−01	SEALING	SLFA−20
21	U8O2O3O300	CABLE HOLDER	SLFA−20
22	H508676−01	STAT	A=6,B=6,C=12,D=3,E=4,F=4

SLFA−20

GENERAL VIEW

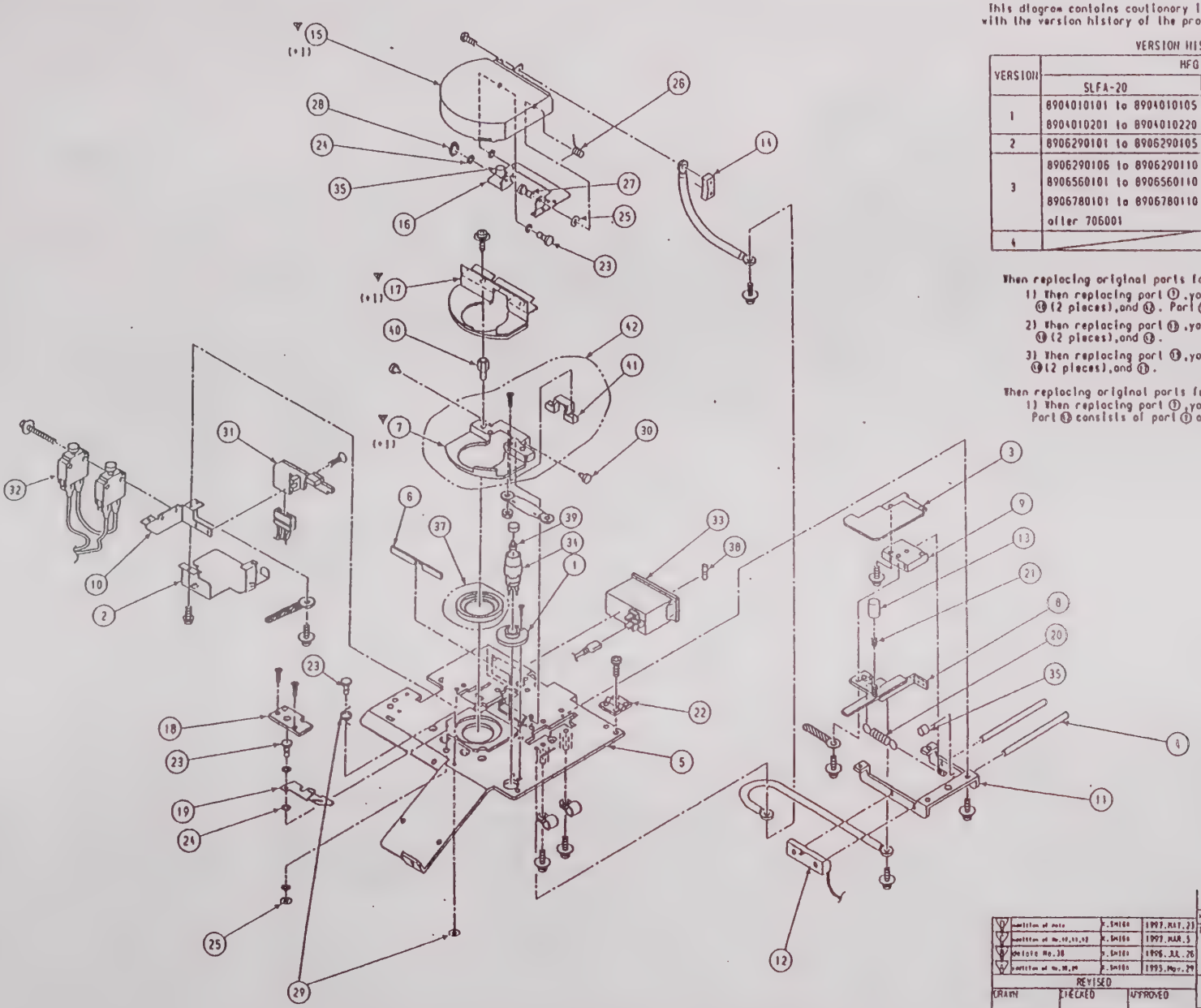


			S911789A
NO.	SPEC.	PARTS NO.	NOTES

NAME: SLFA-20 CHASSIS UNIT

REVISED			
DRAWN	DESIGNED	APPROVED	SCALE 1/1
K.SHIGA	H.MIZUTA	Y.OKADA	A-CAD DRAWING NO. S220014A
			DATE 1995.NOV.28

No.	PARTS No.	PARTS NAME	DESCRIPTION
1	U801316100	CHASSIS UNIT	FOR SLFA−20
2	U801316600	STAY UNIT	FOR SLFA−20
3	U801224600	COVER UNIT	FOR SLFA−20
4	H584104−01	SHEET	FOR SLFA−20
5	U801315800	COVER, CONNECTOR	FOR SLFA−20
6	H585114−01	FAN GUARD	FOR SLFA−20
7	H584914−01	FILTER	FOR FAN, SLFA−20
8	H584905−01	FILTER, COVER	FOR SLFA−20
9	E012947200	SPACER	FGS−6S
10	F022968600	SPACER, CARD	KGPS−6S
11	F021625300	HINGE	B−1100−1
12	F023082900	SPACER	4EP−4
13	F022017500	STAY	P−523−10 L:10 (BS−NI3)
14	U801234700	FRONT PANEL ASSY	FOR SLFA−20
15	U801274000	FAN ASSY	SLFA−20
16	E013010600	POWER SUPPLY	LWT−30H−5FF
17	U801233900	LCD ASSY	SLFA−20
18	F023008000	SPACER, WS	WS−2NS
19	H562510−01	VOLUME CONTROL	F−22,23,24 MAIN UNIT
20	U801195100	PCB, ASSY	SLFA−MCT−01/SLFA−20
21	U801188500	PCB, ASSY	SLFA−XHV−02
22	F021359000	RUBBER, FOOT	SJ−5008
23	F021625000	RUBBER, FOOT	SJ−5017
24	E012926700	BATTERY	ER6CWK55 (1800MAH LEAD)
25	H584058−01	SEAL	CR SPONGE FOR SLFA−20



▼ (*1)
This diagram contains cautionary information for use in accordance with the version history of the product.

VERSION HISTORY

VERSION	HFG No.	
	SLFA-20	SLFA-201
1	8904010101 to 8904010105 8904010201 to 8904010220	8905580101 to 8905580110
2	8906290101 to 8906290105	
3	8906290106 to 8906290110 8906560101 to 8906560110 8906780101 to 8906780110 after 706001	8906190101 to 8906190110 8907100101 to 8907100110
4		after 707001

When replacing original parts for version1 and version2 (SLFA-201).
1) When replacing part ⑦, you will need the new parts: ①, ⑧ (2 pieces), and ⑭. Part ⑦ consists of part ⑦ and part ⑭.
2) When replacing part ⑧, you will need the new parts: ①, ⑧ (2 pieces), and ⑬.
3) When replacing part ⑨, you will need the new parts: ⑪, ⑨, ⑨ (2 pieces), and ⑪.

When replacing original parts for version1 (SLFA-201).
1) When replacing part ⑦, you will need the new part: ⑦. Part ⑦ consists of part ⑦ and part ⑭.

NO.	DESCRIPTION	DATE
▼	[illegible]	1997.MAY.23
▼	[illegible]	1997.MAR.5
▼	[illegible]	1996.JUL.26
▼	[illegible]	1995.Nov.29

REVISED

DRAWN	CHECKED	APPROVED
K.SHIGA	H.MIZUTA	K.OBORI

No.	SPEC.	PARTS NO.	NOTES
			S911788

NAME: SLFA-20 DWEBER UNIT

SCALE: 1/1

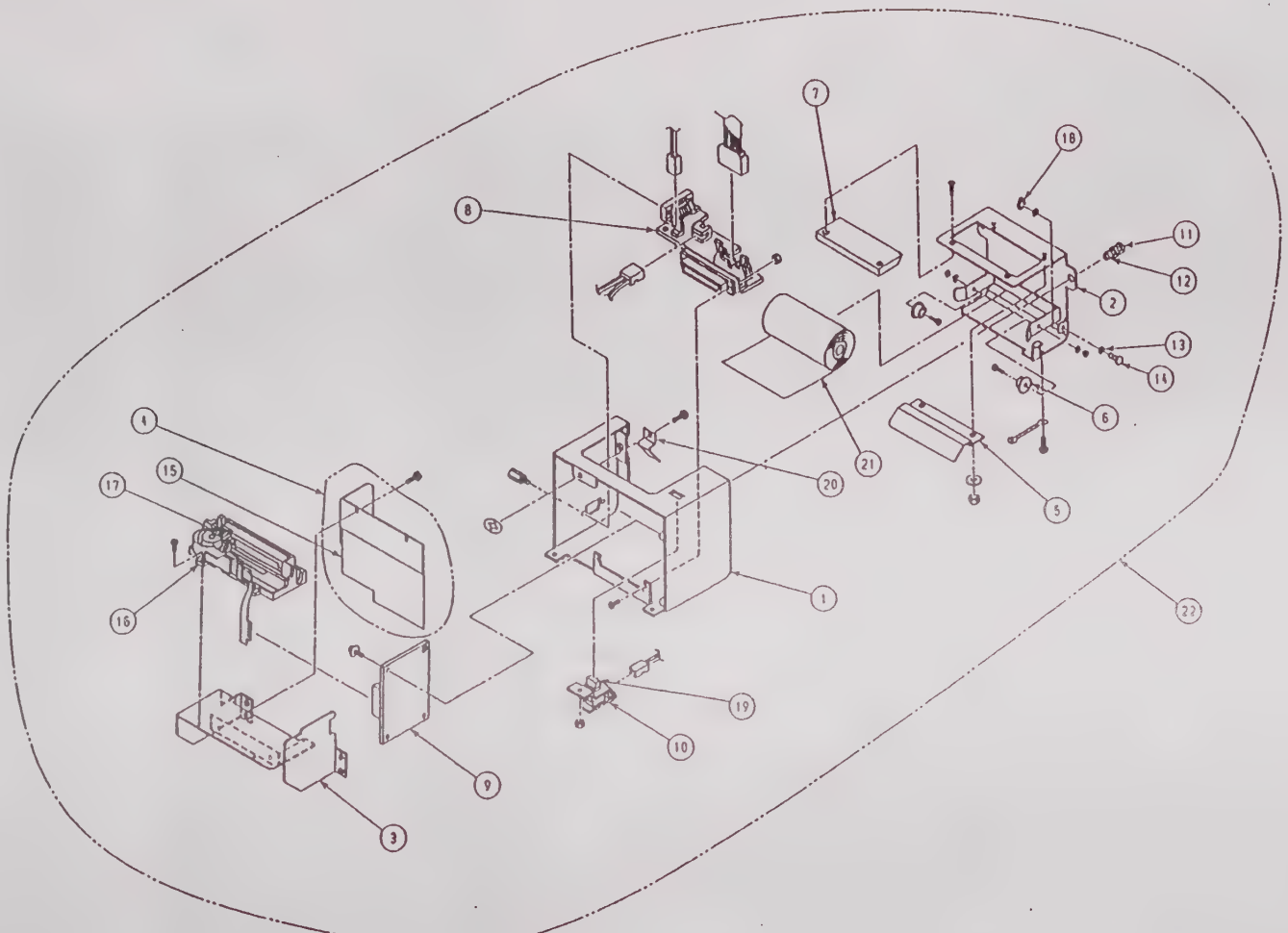
DATE: 1997.MAY.23

A-CAD DRAWING NO.: S220013D

No.	PARTS No.	PARTS NAME	DESCRIPTION
1	H583629-01	SPACER, LAMP	FOR SLFA-20
2	H383857-01	COVER	FOR SLFA-20
3	H386319-01	SHUTTER	FOR SLFA-20
4	H571546-01	GROUND	FOR SLFA-20
5	U801224800	SHUTTER,BASE	FOR SLFA-20
6	H584060-01	PCB, SPONGE	FOR SLFA-20
7	U802030500	MEMBRANE HOLDER	FOR SLFA-20
8	U801315900	LEVER	FOR SLFA-20
9	U801316000	SLIDE, BLOCK	FOR SLFA-20
10	H584080-01	BRACKET, PCB,	FOR SLFA-20
11	U801317000	BRACKET	FOR SLFA-20
12	H584853-01	BRACKET,SENSOR	FOR SLFA-20
13	H581861-01	LEVER GRIP	SLFA-20
14	H571554-01	CAM	FOR SLFA-20
15	U801224700	CHAMBER,COVER	FOR SLFA-20
16	U801316900	STAY, DOOR	FOR SLFA-20
17	U802030400	HOLDER COVER	FOR SLFA-20
18	U801316800	STOPPER, HOLDER	FOR SLFA-20
19	H584592-01	STOPPER	FOR SLFA-20
20	F023015400	SPRING, TENSION	SH063-07
21	F023015500	SCREW	JISB1177 (M4X 8(SUS304)
22	F021625300	HINGE	B-1100-1
23	F022968200	REVET	JISB1213 (4X 8(SUS)
24	F020455200	WASHER	STW-FT40 (T=0.5)
25	F021495100	PUSH, NUT	SPN-4(SUS)
26	U801317100	SPRING	FOR SLFA-20 (056B)
27	F022968300	REVET	JISB1213 M4X12(SUS)
28	F022960900	RING-G	GTW-4 (SUS)
29	U801317200	P-NUT,SPRING	FOR SLFA-20
30	F021281500	CLIP	TL-180 NO.02(1418) (WHITE)
31	U801233200	PCB, SLFA-SEN-0	SLFA-20
32	E011680500	MICRO SWITCH	D2D-2000
33	E013056100	NOISE FILTER	06AR2D(250v,4A)
34	E013044000	LAMP,DISPLAY	MHL-R1RGS2
35	U801317300	RUBBER CUSHION	FOR SLFA-20
37	H543072-01	FILM HOLDER	SLFA-1100
38	E010700200	FUSE	ST-1A
39	9038001900	LAMP,SET	FOR SLFA-20
40	H508676-03	STAY	A=6,B=6,C=12,D=3,E=4,F=4
41	H592274-01	SENSOR COVER	FOR SLFA-20
42	U802030600	MEMBRANE HOLDER	FOR SLFA-20

SLFA-20

CHAMBER UNIT



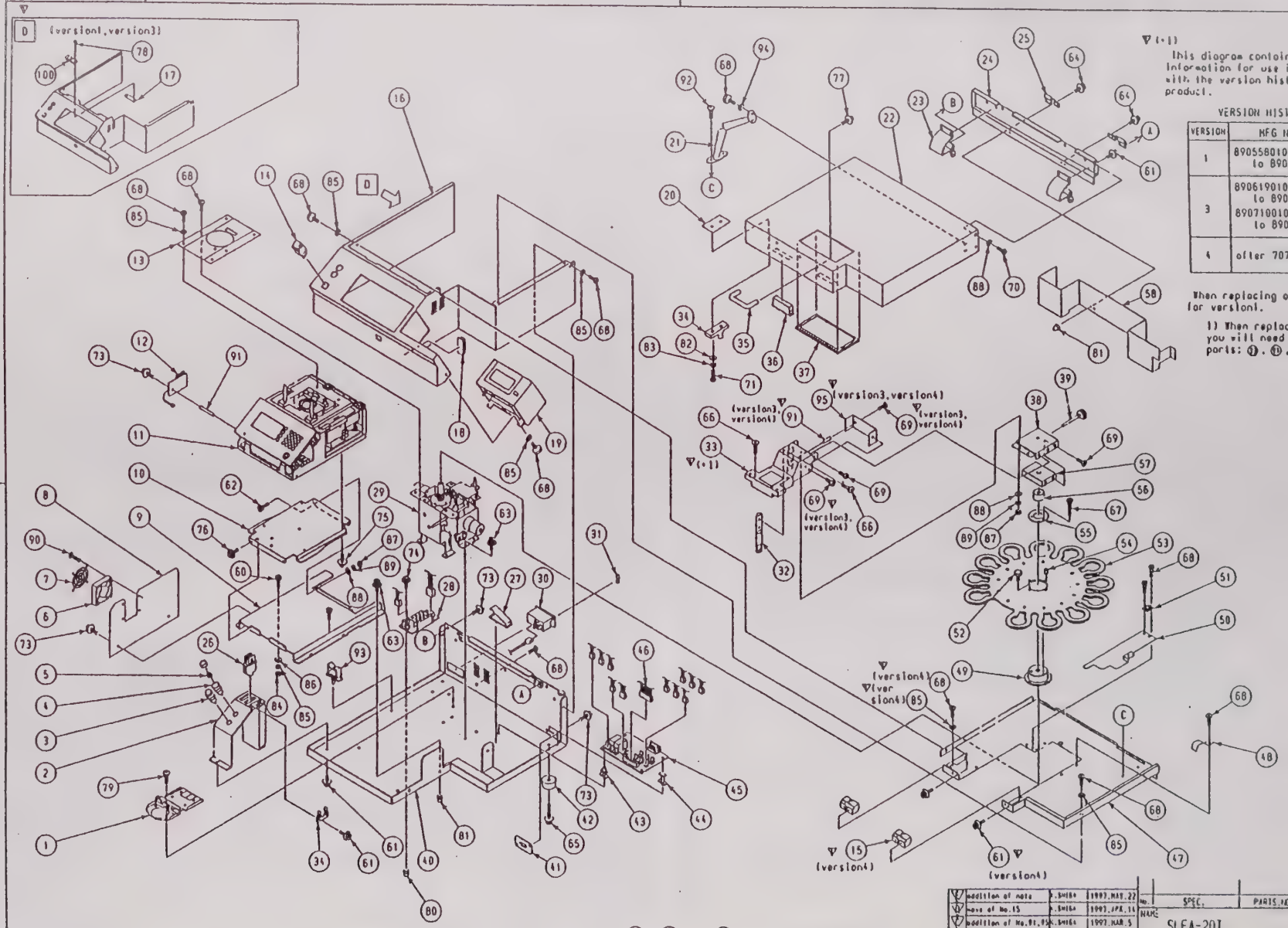
				S911790A
NO.	SPEC.	PARTS NO.	NOTES	
NAME	SLFA-20 PRINTER UNIT			
REVISED			1995.NOV.29	
DRAWN	DESIGNED	APPROVED	SCALE	A-CAD DRAWING NO.
K.SHIGA	M.MIZUTA	Y.OKADA	1/1	S220015A
			DATE 1995.NOV.29	

No.	PARTS No.	PARTS NAME	DESCRIPTION
1	U801315500	COVER, PRINTER	FOR SLFA−20
2	U801315600	DOOR, PRINTER	FOR SLFA−20
3	H240700−01	STAY, PRINTER	FOR SLFA−20
4	U801316500	COVER PLATE	FOR SLFA−20
5	H584207−01	GUIDE	FOR SLFA−20
6	H584167−01	SPACER	FOR SLFA−20
7	H582807−01	PAPER CUTTER	PMMA, FOR PRINTER UNIT (SLFA−20)
8	U801233300	PCB, SLFA−SCN−0	SLFA−20
9	E012953300	INTERFACE	EPTR2001 (EPT20XXSXL,LG)
10	U801274200	PCB, SCN−01	SLFA−20
11	F020326300	LATCH	H323−2−5−2 (PLUNGER)
12	F020326200	LATCH	H322−2−2 (GROMMET)
13	F020455200	WASHER	STW−FT40 (T=0.5)
14	F022968200	REVET	JISB1213 (4X 8(SUS)
15	H584598−01	COVER, SHEET	FOR SLFA−20
16	U801316200	PRINTER,THERMA	EPT2025S3LG(80MM,8DOTS,42DIGITS),SLFA−20
17	U801355100	PRINTER HEAD CO	SLFA−20
18	F022960900	RING−G	GTW−4 (SUS)
19	E010810800	BUTTON	MK2 NO.16.300
20	E010770800	HOLDER	RH−14
21	9038002000	CHART PAPER	F200U9W6−M(5 SET) 80MMX30M
22	U801234400	PRINTER UNIT	FOR SLFA−20

S220046E

HORIBA

EXTERIOR DRAWING


D (version1,version3)
▽(・1)
This diagram contains cautionary information for use in accordance with the version history of the product.
VERSION HISTORY
VERSION | MFG No.
1 | 8905580101 to 8905580110
3 | 8906190101 to 8906190110, 8907100101 to 8907100110
4 | after 707001
When replacing original parts for version1.
1) When replacing part ①, you will need the new parts: ①, ⑪, ⑧, and ⑭.
▽ (version3,version4)
▽ (version1, version4)
▽ (version4)
▽ (version1)

▽	addition of note	S.SHIBA	1997.MAR.22		
▽	move of No.15	S.SHIBA	1997.APR.14		
▽	addition of No.81,85	S.SHIBA	1997.MAR.5		
▽	addition of note	S.SHIBA	1996.SEP.18		

No.	SPEC.	PARTS NO.	NOTES
NAME	SLFA-20T		

S9117934

▽ Since 1/ SLFA-20 contains parts (4) (5) or (7), they are not included

JUNE 1997

PARTS LIST

SULFUR-IN-OIL-ANALYZER

< SLFA-20T >

UNIT NAME	DRAWING NO.
GENERAL VIEW	S220046E
SUPPLEMENTAL PARTS FOR TURNTABLE	S220050B
CHAMBER UNIT	S220013D
TURNTABLE UNIT	S220059
PRINTER UNIT	S220015A

CODE: P960002801

HORIBA,Ltd.
KYOTO, JAPAN

N O	PARTS NO	PARTS NAME	DESCRIPTION
1	U802030700	ADJUSTING PLATE	SLFA-20T
2	H383154-01	STAY, LAMP	FOR SLFA-20T
3	E013126100	DISPLAY ASSY	MIL-R50GGS1
4	E013044000	LAMP, DISPLAY	MIL-R1RGS2
5	9038001900	LAMP, SET	FOR SLFA-20
6	U801404200	FAN-2 UNIT	FOR SLFA-20T
7	F022910500	FAN, GUARD	GGO-4(F614R)
8	H588112-01	BRACKET, FAN	FOR SLFA-20T
9	H383413-01	BASE, BOTTOM	FOR SLFA-20T
10	H383412-01	BASE, TOP	FOR SLFA-20T
11	S911791A	SUPPLEMENTAL PA	PLEASE REFER TO DRAWING S220050A
12	U801188800	PCB. ASSY	SCN-01
13	U802018700	PLATE, CONNECTOR	FOR SLFA-20T
14	E013126700	SWICH, ILLUMINA	EHA-4S05WHXP3
15	H592915-01	CATCH PLATE	SLFA-20T
16	U802009900	COVER	FOR SLFA-20T
17	H589104-01	TAP, PLATE-1	FOR SLFA-20T
18	E013092300	COALESCER	BCN-40
19	S911790A	PRINTER	PLEASE REFER TO DRAWING S220015A
20	H589105-01	TAP, PLATE-2	FOR SLFA-20T
21	F023126200	STAY	B- 82-3
22	U802010000	COVER, SAMPLLER	FOR SLFA-20T
23	H383132-01	HINGE	FOR SLFA-20T F023118800
24	H383121-01	HINGE, STAY	FOR SLFA-20T
25	F023033900	STOP, HINGE	TH-122-1A
26	E013125500	SWITCH, MICRO	AV1225
27	E010738800	CRAMP, CABLE	FCN-6010
28	E013164100	POWER SUPPLY	LDA10F-24SN
29	S911792A	TURN TABLE UNIT	PLEASE REFER TO DRAWING S220059
30	E013056100	NOISE FILTER	06AR2D(250v, 4A)
31	E010700300	FUSE	ST-2
32	H587616-01	CHAFT, LOCK	FOR SLFA-20T
33	U802010300	COVER, CHAMMBER	FOR SLFA-20T
34	F023183700	ROTARY, CATCH	TL-117-1
35	F023123400	GRIP	THA-132B NO. 4
36	F022098000	MAGNET CATCH	TL-238 NO. 2
37	H586189-01	WINDOW	FOR SLFA-20T
38	U802010200	ARM	FOR SLFA-20T
39	F021910800	SCREW	M4X28 (BLACK)
40	U802009800	CHASSIS	FOR SLFA-20T
41	H586193-01	COVER, CONNECTO	FOR SLFA-20T
42	F020280100	RUBBER FOOT	C-30-RK-3225
43	E012947200	SPACER	FGS-6S
44	F022968600	SPACER, CARD	KGPS-6S
45	U801404300	PCB. ASSY	SLFA-MDR-07
46	U801188900	CABLE, FLAT	D-SUB:37
47	U802010100	COVER, INTERNAL	FOR SLFA-20T
48	E013120500	FORM, SEALED	97-440
49	U802010600	TABLE, BOSS	FOR SLFA-20T
50	U802018800	COVER, SW	FOR SLFA-20T

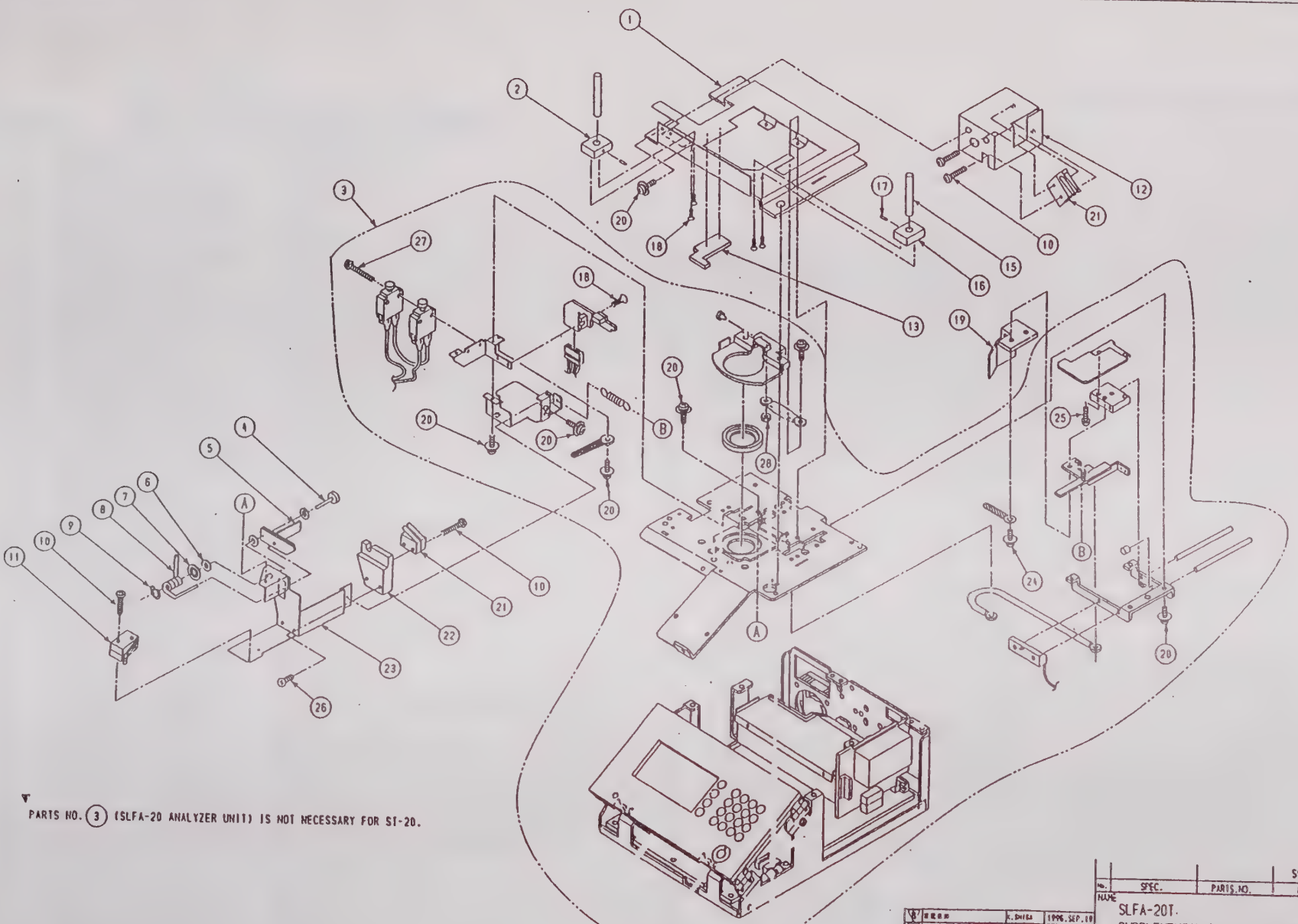
N O	PARTS NO	PARTS NAME	DESCRIPTION
51	F021625300	HINGE	B-1100-1
52	F021434900	SCREW	M3 X8
53	U802009700	TRUN TABLE	FOR SLFA-20T
54	F023146400	STOPPER, PIN	
55	H584937-01	PLATE, RETAINER	FOR SLFA-20T
56	H582951-01	PLATE, RETAINER	FOR SLFA-20T TRUN TABLE
57	H587632-01	COVER, BOSS	FOR SLFA-20T
58	U802018300	HINGE, COVER	FOR SLFA-20T
60	F020459800	CAP SCREW	JISB1176 M3X6 (SUS304)
61	F022652900	BOLT, W/HEXAGON	M3X6, SUS-304, W/SPRING WASHER AND FLAT
62	F020213000	BOLT, W/HEXAGON	JISB1176 M 4X 8(SUS304), W/SPRIG WASHER
63	F022708200	BOLT, W/HEXAGON	M 4X 8(SUS304), W/SPRIG WASHER AND FLAT
64	F022708400	BOLT, W/HEXAGON	M 4X 12(SUS304), W/SPRIG WASHER AND FLAT
65	F022708500	BOLT, W/HEXAGON	M 4X 20(SUS304), W/SPRIG WASHER AND FLAT
66	F022976300	SCREW	M3X 8(SUS304)
67	F023158800	BOLT, W/HEXAGON	M3X6(SUS304)
68	F020486400	SCREW, BINDING	JISB1111 M3X6
69	F020525900	SCREW	JISB1111 M3X8(S-CR3)
70	F021329900	SCREW	JISB1111 M4X6 (S-CR3)
71	F020095000	SCREW, PANHEAD	M3-6L SUS304
73	F020101500	SCREW	M3X6(S-ZN3), W/ SPRING & FLAT WASHERS
74	F020101200	SCREW, PANHEAD	M3-3L FE
75	F020185900	SCREW	M4X 6(S-ZN3)
76	F020101700	SCREW	M4X8 (S-ZN3), W/SPRING & FLAT WASHERS
77	F020244600	SCREW	M5X10(S-ZN3)
78	F020011700	SCREW	JISB1111 M2 X 5(SUS304)
79	F020011500	SCREW	JISB1111 M3X6(S-ZN3)
80	F020488800	W-JOINT	M3(SUS304)
81	F021332700	CAP NUT	JISB1183 M 4(SUS304)
82	F022735800	WASHER	JISB1256 2.6(SUS304)
83	F020324800	WASHER, LOCK	JISB1251 2.6(SUS304)
84	F020116800	NUT	6WAY, JISB1181, M3(SUS304)
85	F021276100	LOCK WASHER	TM-147-1 (M3)
86	F020017300	WASHER, SPRING	B1251 2 M3 SUS304
87	F020014600	NUT, LOCK	JISB1181 M 4(SUS304)
88	F020016100	WASHER, FLAT	B1256 M4 SUS304
89	F020017400	WASHER, SPRING	B1251 2 M4 SUS304
90	F023190000	SCREW, BINDING	JISB1111 M4X30(S-CR3)
91	F022017700	STAY	P-523-14 (BS-N13)
92	F020040100	SCREW, COUNTERS	B111 M3-6L SUS304
93	F023008000	SPACER, WS	WS-2NS
94	F020016000	WASHER, FLAT	B1256 M3 SUS304
95	U802030800	GUARD	SLFA-20T
100	H589103-01	PLATE	FOR SLFA-20T

(S911793)

SLFA-20T

GENERL EXPLODED VIEW

EXTERIOR DRAWING



▼
PARTS NO. (3) (SLFA-20 ANALYZER UNIT) IS NOT NECESSARY FOR SI-20.

▼	[illegible]	K.SHIGA	1996.SEP.10
▽	[illegible]	K.SHIGA	1996.JUL.24

REVISED

DRAWN	DESIGNED	APPROVED
K.SHIGA	M.MIZUTA	K.OBORI

No.	SPEC.	PARTS NO.	NOTES
			S911791A

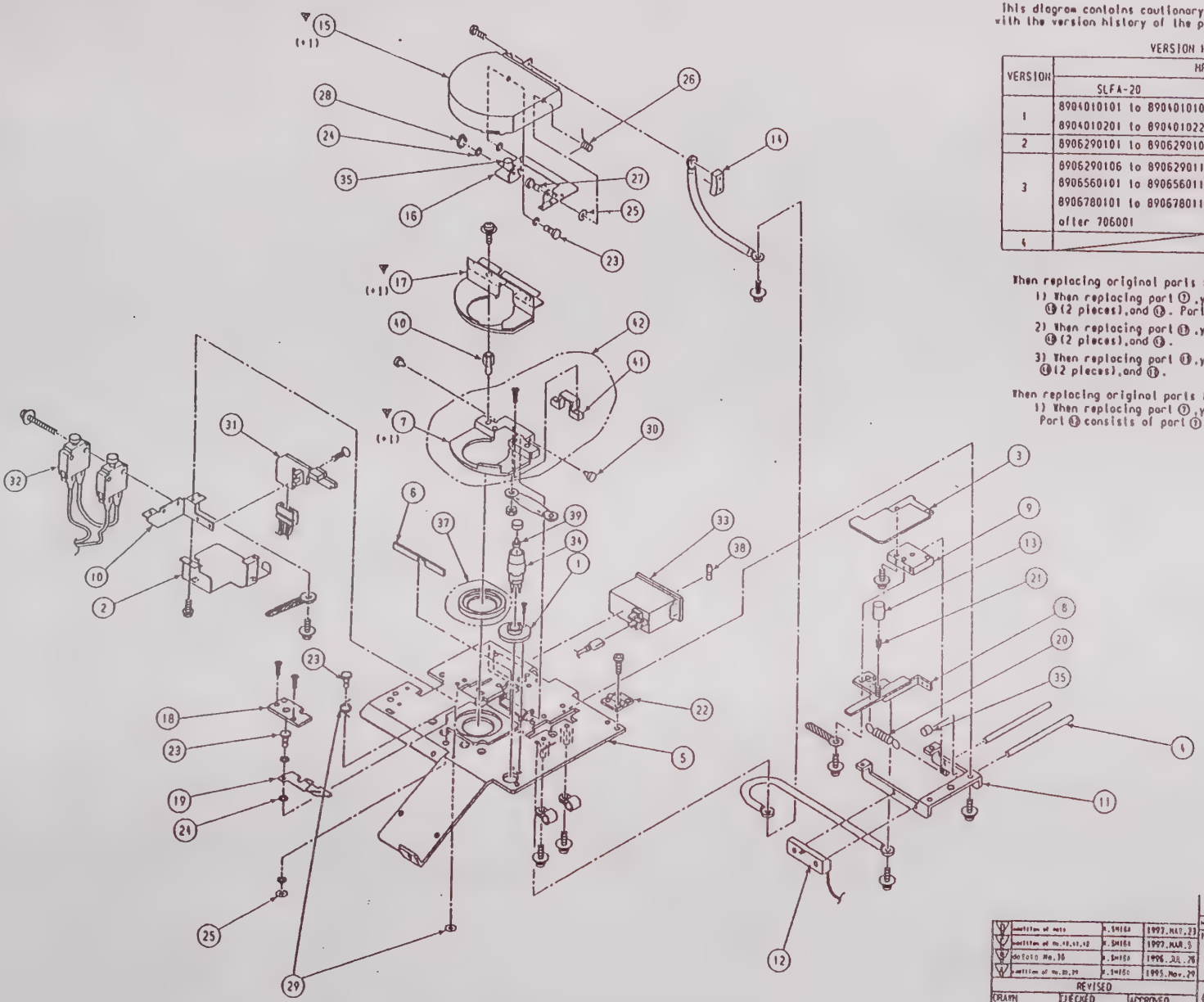
NAME: SLFA-20T.
SUPPLEMENTAL PARTS FOR TURNTABLE

SCALE: Free
DATE: 1996.SEP.20

A-CAD DRAWING NO.
S220050B

HORIBA,Ltd.

N O	PARTS NO	PARTS NAME	DESCRIPTION
1	U802018100	COVER, FRONT	FOR SLFA-20T
2	H587612-01	BASE, CHAFT-L	FOR SLFA-20T
3	S911788A	CHAMBER UNIT	PLEASE REFER TO DRAWING S220013-01
4	F022968300	REVET	JISB1213 M4X12(SUS)
5	H587657-01	STOPPER	FOR SLFA-20T
6	F020455200	WASHER	STW-FT40 (T=0.5)
7	F021495100	PUSH, NUT	SPN-4(SUS)
8	U802018200	SPRING	FOR SLFA-20T
9	F022960900	RING-G	GTW-4 (SUS)
10	F021103400	SCREW	JISB1111 M2 X16(SUS304)
11	E012183200	SWITCH, MICRO	SS-5GL13
12	H383803-01	BRACKET, SW	FOR SLFA-20T
13	H588057-01	SEAL	FORSLFA-20T
15	H587613-01	COVER, CHAFT	FOR SLFA-20T
16	H587611-01	BASE, CHAFT-R	FOR SLFA-20T
17	F020064800	SCREW	B1177 M3-4L SUS304
18	F020011500	SCREW	JISB1111 M3X6(S-ZN3)
19	H587650-01	PLATE, SW	FOR SLFA-20T
20	F020101500	SCREW	M3X8(S-ZN3), W/ SPRING & FLAT WASHERS
21	E010374300	MICRO SWITCH	SS-5GL
22	H587633-01	STOPPER, GUIDE	FOR SLFA-20T
23	H383839-01	STOPPER, BRACKET	FOR SLFA-20T
24	F020101200	SCREW, PANHEAD	M3-3L FE
25	F020120100	SCREW, PANHEAD	M4-6L FE
26	F020040100	SCREW, COUNTERS	B111 M3-6L SUS304
27	F020121200	SCREW	P-HD PHIL W/CAPTIVE WASHER, M4X30
28	F020116800	NUT	6WAY, JISB1181, M3(SUS304)



▼ (*1)
This diagram contains cautionary information for use in accordance with the version history of the product.

VERSION HISTORY

VERSION	MFG No.	
	SLFA-20	SLFA-20I
1	8904010101 to 8904010105 8904010201 to 8904010220	8905580101 to 8905580110
2	8906290101 to 8906290105	
3	8906290106 to 8906290110 8906560101 to 8906560110 8906780101 to 8906780110 after 706001	8906190101 to 8906190110 8907100101 to 8907100110
4		after 707001

When replacing original parts for version1 and version2 (SLFA-20).
1) When replacing part ①, you will need the new parts: ⑪, ⑭ (2 pieces), and ⑮. Part ⑮ consists of part ① and part ⑤.
2) When replacing part ⑪, you will need the new parts: ⑪, ⑭ (2 pieces), and ⑮.
3) When replacing part ⑪, you will need the new parts: ⑬, ⑮, ⑭ (2 pieces), and ⑪.

When replacing original parts for version1 (SLFA-20I).
1) When replacing part ①, you will need the new part: ⑮.
Part ⑮ consists of part ① and part ⑤.

▼	[illegible] of note	K.SHIGA	1997.MAY.23
▼	[illegible] of No.10,11,12	K.SHIGA	1997.MAR.5
▼	Added No.36	K.SHIGA	1996.JUL.26
▼	[illegible] of No.29	K.SHIGA	1995.Nov.29

REVISED

DRAWN	CHECKED	APPROVED
K.SHIGA	M.MIZUIA	K.OBORI

No.	SPEC.	PARTS NO.	NOTES
			S9117E

NAME: SLFA-20 CHAMBER UNIT

SCALE: 1/1

DATE: 1997.MAY.23

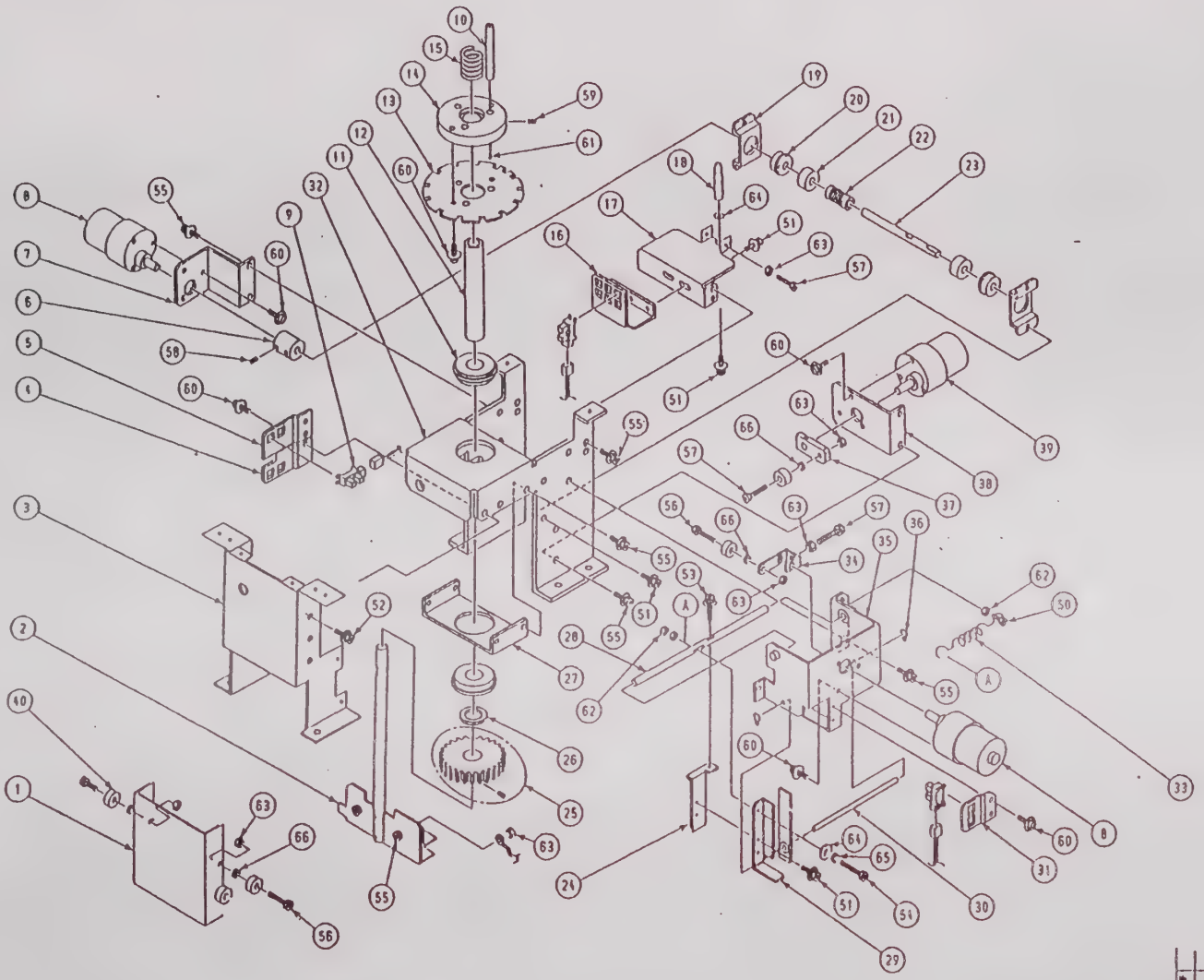
A-CAD DRAWING NO.: S220013D

NOTE

NO	PARTS NO	PARTS NAME	DESCRIPTION
1	H583629-01	SPACER, LAMP	FOR SLFA-20
2	H383857-01	COVER	FOR SLFA-20
3	H386319-01	SHUTTER	SLFA-20
4	H571546-01	GROUND	FOR SLFA-20
5	U801224800	SHUTTER, BASE	FOR SLFA-20
6	H584060-01	PCB, SPONGE	FOR SLFA-20
7	U802030500	MEMBRANE HOLDER	SLFA-20
8	U801315900	LEVER	FOR SLFA-20
9	U801316000	SLIDE, BLOCK	FOR SLFA-20
10	H584080-01	BRACKET, PCB,	FOR SLFA-20
11	U801317000	BRACKET	FOR SLFA-20
12	H584853-01	BRACKET, SENSOR	FOR SLFA-20
13	H581861-01	LEVER GRIP	SLFA-20
14	H571554-01	CAM	FOR SLFA-20
15	U801224700	CHAMBER, COVER	FOR SLFA-20
16	U801316900	STAY, DOOR	FOR SLFA-20
17	U802030400	HOLDER COVER	SLFA-20
18	U801316900	STAY, DOOR	FOR SLFA-20
19	H584592-01	STOPPER	FOR SLFA-20
20	F023015400	SPRING, TENSION	SH063-07
21	F023015500	SCREW	JISB1177 (M4X 8(SUS304)
22	F021625300	HINGE	B-1100-1
23	F022968200	REVET	JISB1213 (4X 8(SUS)
24	F020455200	WASHER	STW-FT40 (T=0.5)
25	F021495100	PUSH, NUT	SPN-4(SUS)
26	U801317100	SPRING	FOR SLFA-20 (056B)
27	F022968300	REVET	JISB1213 M4X12(SUS)
28	F022960900	RING-G	GTW-4 (SUS)
29	U801317200	P-NUT, SPRING	FOR SLFA-20
30	F021281500	CLIP	TL-180 NO.02(1418) (WHITE)
31	U801233200	PCB, SLFA-SEN-0	SLFA-20
32	E011680500	MICRO SWITCH	D2D-2000
33	E013056100	NOISE FILTER	06AR2D(250v, 4A)
34	E013044000	LAMP, DISPLAY	MHL-R1RGS2
35	U801317300	RUBBER CUSHION	FOR SLFA-20
37	U802020600	MEMBRANE, UNIT	FOR SLFA-20T
38	E010700200	FUSE	ST-1A
39	9038001900	LAMP, SET	FOR SLFA-20
40	H508676-03	STAY	A=6, B=6, C=12, D=3, E=4, F=4
41	H592274-01	SENSOR COVER	SLFA-20
42	U802030600	MEMBRANE HOLDER	SLFA-20

SLFA-20T

CHAMBER UNIT



NO.	DESC.	PARTS NO.	NOTES
			S911792A

NAME: SLFA-20T TURNTABLE UNIT

REVISED		
DRAWN	CHECKED	APPROVED
K.SHIGA	M.MIZUTA	K.OBORI

SCALE: Free

DATE: 1996.JUL.9

A-CAD DRAWING NO.: S220059

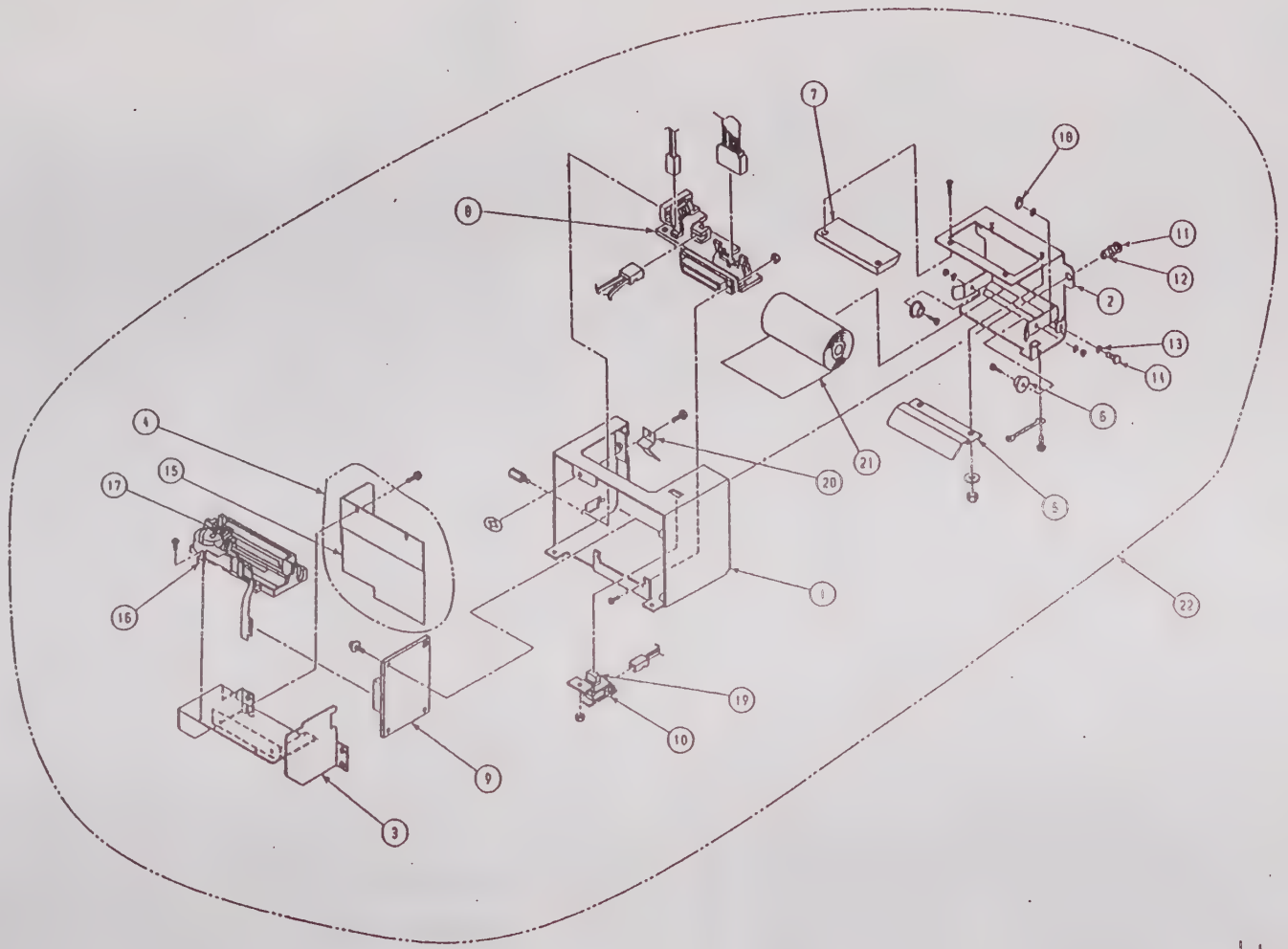
HORIBA,Ltd.

S220059A
(S911792)

NO	PARTS NO	PARTS NAME	DESCRIPTION
1	H587651-01	PLATE	FOR SLFA-20T
2	U802018600	UD, CHAFT	FOR SLFA-20T
3	H383838-01	FRAME, STAY	FOR SLFA-20T
4	H587662-01	UD, SENSOR BOTTO	FOR SLFA-20T
5	H587661-01	UD, SENSOR TOP	FOR SLFA-20T
6	F023165900	COUPLING	MOL-20-D6XD6
7	H583101-01	STAY	FOR SLFA-20T TURNTABLE (M1)
8	E013043400	DC GEAR MOTOR	RB-35GM-CA35-24(I=1/150)
9	E012865700	PHOTO-INTERUPTE	RPI-512
10	H582934-01	GUIDE, SHAFT	FOR SLFA-20T TURNTABLE
11	F022278000	BEARING	6002ZZNR
12	U802010500	SHAFT	FOR SLFA-20T TURNTABLE
13	H584922-01	CHOPPER	FOR SLFA-20T
14	H584906-01	ROTOR, BRACKET	FOR SLFA-20T
15	F022973700	SPRING, PRESSUR	CODE 1184
16	H586373-01	P SENSOR PLATE	FOR SLFA-20T
17	H584898-01	STAY	FOR SLFA-20T
18	H583082-01	PIN	FOR SLFA-20T TURNTABLE
19	H584891-01	HOLDER	FOR SLFA-20T
20	F021483300	BEARING	SSRF-1760X2ZZ (SUS440C)
21	F022353400	SET, COLLAR	SUS-0608
22	F020809100	WORM GEAR	WISR1+B
23	H545510-01	WORM SHAFT	FOR SLFA-20T
24	H587022-01	STOPPER	FOR SLFA-20T
25	U802010400	WORM WHEEL	FOR SLFA-20T TURNTABLE
26	H582943-01	COLLAR	FOR SLFA-20T
27	H584896-01	HOLDER-A	FOR SLFA-20T
28	H383494-01	SHAFT	FOR SLFA-20T TURNTABLE
29	U802018500	BRACKET UNIT	FOR SLFA-20T
30	H571546-01	GROUND	FOR SLFA-20
31	H586369-01	SC SENSOR PLATE	FOR SLFA-20T
32	H240780-01	FRAME	FOR SLFA-20T
33	F023015400	SPRING, TENSION	SH063-07
34	H584902-01	S ARM	FOR SLFA-20T
35	U802018400	STAY	M3 FOR SLFA-20T
36	F022960900	RING-G	GTW-4 (SUS)
37	H587622-01	U.D ARM	FOR SLFA-20T
38	H587638-01	STAY	M2 FOR SLFA-20T
39	E013069100	DC GEAR MOTOR	RB-35GM-CA35-24(I=1/300)
40	F022222200	BEARING	SSR-1240ZZ
50	F020459800	CAP SCREW	JISB1176 M3X6 (SUS304)
51	F022652900	BOLT, W/HEXAGON	M3X6, SUS-304, W/SPRING WASHER AND FLAT
52	F022707900	BOLT, W/HEXAGON	M 3X 8(SUS304)
53	F022708000	BOLT, W/HEXAGON	M3X10, SUS-304, W/SPRING WASHER AND FLAT
54	F020555500	BOLT, SOCKET-HE	B1176 M3-16L SUS304
55	F022708200	BOLT, W/HEXAGON	M 4X 8(SUS304), W/SPRIG WASHER AND FLAT
55	F022708200	BOLT, W/HEXAGON	JISB1176 M4X12 (SUS304)
57	F020212600	BOLT, W/HEXAGON	JISB1176 M 4X 16(SUS304)
58	F020064800	SCREW	B1177 M3-4L SUS304
59	F020067300	SCREW	SET, M4X4, OCMA-32A
60	F020101500	SCREW	M3X6(S-ZN3), W/ SPRING & FLAT WASHERS
61	F022976300	SCREW	M3X 8(SUS304)
62	F020116800	NUT	6WAY, JISB1181, M3(SUS304)
63	F020014600	NUT	JISB1181 M 4(SUS304)
64	F020016000	WASHER, FLAT	B1256 M3 SUS304
65	F020017300	WASHER, SPRING	B1251 2 M3 SUS304
66	F020017400	WASHER, SPRING	B1251 2 M4 SUS304

SLFA-20T

TURNTABLE UNIT



				S911790A
No.	SPEC.	PARTS NO.	NOTES	
NAME	SLFA-20 PRINTER UNIT			

REVISED			
DRAWN	CHECKED	APPROVED	SCALE 1/1
K.SHIBA	M.MIZUTA	Y.OKADA	DATE 1995.NOV.29

A-CAD DRAWING NO. S220015A

HORIBA,LT

S220015A
(S911790)

NO	PARTS NO	PARTS NAME	DESCRIPTION
1	U801315500	COVER, PRINTER	FOR SLFA-20
2	U801315600	DOOR, PRINTER	FOR SLFA-20
3	H240700-01	STAY, PRINTER	FOR SLFA-20
4	U801315600	DOOR, PRINTER	FOR SLFA-20
5	H584207-01	GUIDE	FOR SLFA-20
6	H584167-01	SPACER	FOR SLFA-20
7	H582807-01	PAPER CUTTER	PMMA, FOR PRINTER UNIT (SLFA-20)
8	U801233300	PCB, SLFA-SCN-0	SLFA-20
9	E012953300	INTERFACE	EPTR2001 (EPT20XXSXL, LG)
10	U801274200	PCB, SCN-01	SLFA-20
11	F020326300	LATCH	H323-2-5-2 (PLUNGER)
12	F020326200	LATCH	H322-2-2 (GROMMET)
13	F020455200	WASHER	STW-FT40 (T=0.5)
14	F022968200	REVET	JISB1213 (4X 8(SUS)
15	H584598-01	COVER, SHEET	FOR SLFA-20
16	U801316200	PRINTER, THERMA	EPT2025S3LG(80MM, 8DOTS, 42DIGITS), SLFA-
17	U801355100	PRINTER HEAD CO	SLFA-20
18	F022960900	RING-G	GTW-4 (SUS)
19	E010810800	BUTTON	MK2 NO.16.300
20	E010770800	HOLDER	RH-14
21	9038002000	CHART PAPER	F200U9W6-M(5 SET) 80MMX30M
22	U801234400	PRINTER UNIT	FOR SLFA-20

Product History

	SLFA-20, MFG no. or lot no.	SLFA-20T, MFG no. or lot no.	Engineering Change Ordoer No.
Ver. 1	8904010101 to 8904010105 8904010201 to 8904010220	8905580101 to 8905580110	
Ver. 2	8906290101 to 8906290105		ECO975168
Ver. 3	8906290106 to 8906290110 8906560101 to 8906560110 8906780101 to 8906780110 Lot 706 and later lots (706001 and on)	8906190101 to 8906190110 8907100101 to 8907100110	ECO975168
Ver. 4		Lot 707 and later lots (707001 and on)	ECO975260

ERROR REPORTING FORM

Does this manual help you in servicing HORIBA Products?
If is our policy to make our service manual a good partner to service personnel. But you may think our best efforts are frustrating.
You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures please let us know. All comments will be appreciated, and will be given immediate attention To help us evaluate your recommendations, please explain the reason for each of your recommendations.
Mail this form to our Service Dept. HORIBA,JAPAN.

Your name		Date	
Company,Div.,Dept.		Phone	( ) –
Address		FAX	( ) –

Page No.	Para/Fig/ Table No.	What is wrong and what should be done about it.

Comments and recommendations

Thank you.

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HORIBA

ETY PAGES

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MP MASTER
MA28438

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